

REPORT

OF THE

SECRETARY OF THE INTERIOR

TO THE

PHILIPPINE COMMISSION

FOR THE

YEAR ENDING AUGUST 31, 1902.

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REPORT

OF THE

SECRETARY OF THE INTERIOR.

DEPARTMENT OF THE INTERIOR,

Manila, P. I., November 1, 1902.

GENTLEMEN: I have the honor to present my first annual report, which, unless otherwise expressly stated, covers the year ending August 31, 1902.

ORGANIZATION OF THE DEPARTMENT.

Act No. 222, providing for the organization of the Departments of the Interior, Commerce and Police, Finance and Justice, and Public Instruction, enacted September 6, 1901, placed within the executive control of the Department of the Interior the Bureau of Public Health, the Quarantine Service of the Marine-Hospital Corps, the Bureau of Forestry, the Bureau of Mining, a Bureau of Agriculture, a Bureau of Fisheries, the Weather Bureau, a Bureau of Pagan and Mohammedan Tribes, the Bureau of Public Lands, the Bureau of Government Laboratories, and the Bureau of Patents and Copyrights.

The Bureau of Public Health, the Quarantine Service of the Marine-Hospital Corps, the Bureau of Forestry, the Bureau of Mining, the Weather Bureau, the Bureau of Public Lands, the Bureau of Government Laboratories, and the Bureau of Patents and Copyrights were organized prior to the passage of Act No. 222. The Bureau of Agriculture and the Bureau of Non-Christian Tribes have since been organized.

There have also been established within the past year a Civil Hospital at Manila and a Civil Sanitarium at Baguio, Benguet, for the treatment of civil officers, employees, and members of their families. Both of these institutions are under the executive control of the Department of the Interior, as is the Board of Medical Examiners provided for by Act No. 310.

THE BOARD OF HEALTH FOR THE PHILIPPINE ISLANDS AND THE CITY OF MANILA.

A heavy burden of work has rested upon the Insular Board of Health from the time of its organization. The Board consists of a Commissioner of Public Health, a Sanitary Engineer, a Chief Health Inspector, a Secretary, and ex officio the Superintendent of Government Laboratories.

Lieut. Col. L. M. Maus, Deputy Surgeon-General, United States Army, was detailed as Commissioner of Public Health on July 26, 1901; Major Franklin A. Meacham was appointed Chief Health Inspector August 9, 1901; Dr. Paul C. Freer entered upon the discharge of his duties as Superintendent of Government Laboratories August 9, 1901; Dr. Manuel Gomez was appointed Secretary of the Board August 9, 1901; Captain C. W. Mead, City Engineer of Manila, was by virtue of his position the Sanitary Engineer of the Board from the date of its organization. With the exception of Dr. Meacham, who had been a member of the Board of Health of Manila, organized under the military government, while serving as major and chief surgeon, U. S. V., these gentlemen were all new to their duties. Major Meacham resigned from the Army to accept appointment as Chief Health Inspector.

LEGISLATION RECOMMENDED BY THE BOARD.

Act No. 157 requires the Insular Board of Health to draft and recommend to the central legislative body of the Islands suitable sanitary laws. In compliance with this act the Board has within the past year drafted and recommended to the Commission: "An Act regulating the practice of medicine and surgery in the Philippine Islands;" "An Act regulating the practice of pharmacy in the Philippine Islands;" "An Act regulating the practice of dentistry in the Philippine Islands;" "An Act regulating the practice of veterin-

ary medicine, surgery, and dentistry in the Philippine Islands;" "An Act providing for the establishment of provincial boards of health, and fixing their powers and duties;" "An Act providing for the establishment of municipal boards of health, and fixing their powers and duties;" "An Act providing for the compulsory vaccination of the inhabitants of the Philippine Islands;" "An Act providing for the control and suppression of leprosy in the Philippine Islands;" "An Act regulating the manufacture, sale, and other disposition of alcoholic beverages in the Philippine Islands;" and "An Act transferring the employees of the Board of Health of the city of Manila under the Provost-Marshal-General to the Board of Health for the Philippine Islands."

The presence of bubonic plague in the city of Manila made it important that there should be no lapse in the health work upon the turning over of the city government to the civil authorities, and the first of these measures to be considered and adopted in modified form by the Commission was that providing for transferring the old employees of the Board of Health of Manila *en masse* to the Insular Board of Health.

An Act providing for the interment or burning of the bodies of animals which die having rinderpest, and prohibiting the sale or use of any part thereof, was enacted October 11, 1901.

ORGANIZATION OF PROVINCIAL AND MUNICIPAL BOARDS OF HEALTH.

The next necessity was deemed to be adequate provision for the extension of the public health service to the several provinces and municipalities of this Archipelago. The establishment of provincial boards of health was provided for by Act No. 307, enacted on December 2, 1901, and that of municipal boards of health by Act No. 308, enacted upon the same date.

A provincial board of health consists of a president, who must be a duly qualified physician, the president of the municipal board of health for the capital of the province, and the provincial supervisor, who is required by law to be a civil engineer. The provincial secretary acts as secretary for the board, and the senior medical officer of the Army or Navy of the United States on duty at the capital of the province is an honorary and consulting member, but is not entitled to vote. The legal adviser of the board is the provincial fiscal. The only burden imposed upon the treasury of a

province by the establishment of a provincial board of health is the salary of its president.

A municipal board of health consists of a president, who must be a duly qualified physician or an undergraduate of medicine, a member chosen by a majority vote of the municipal council, a male school-teacher of the municipality appointed by the division superintendent of public instruction for the division in which the municipality is situated, the municipal secretary ex officio, and a pharmacist, if there be one resident within the municipality, who is appointed an honorary member of the board by the municipal president. The senior medical officer of the Army or Navy of the United States, if there be any on duty in the municipality, is an honorary and consulting member of the board. The municipal secretary, the pharmacist member, and the military or naval member are not entitled to vote.

Presidents of provincial boards of health are appointed by the Civil Governor, by and with the consent of the Commission. Presidents of municipal boards of health are appointed by the Commissioner of Public Health, upon the recommendation of the provincial board of health. Municipal boards of health are subordinate to provincial boards of health, which in their turn are subordinate to the Board of Health for the Philippine Islands.

The time for the organization of a board of health in any given province is determined by recommendation of the Insular Board of Health, subject to the approval of the Secretary of the Interior. Municipal boards of health are organized at such time as the provincial board of health for the province in which such municipalities are situated directs and the provincial board (consisting of the provincial governor, the provincial treasurer, and the provincial supervisor) approves.

Grave difficulties have been encountered in putting into effect this theoretically simple system, from the fact that in many of the municipalities there is no person fitted by education to be the president of a municipal board of health. In fact it has been far from easy to secure a sufficient number of competent physicians to act as presidents of provincial boards of health.

The outbreak of cholera made it necessary to extend the organization of the public health service to provinces and municipalities much more rapidly than was originally contemplated. Provincial

boards of health have been established in all the provinces except Marinduque, Masbate, Abra, Lepanto-Bontoc, and Benguet. Municipal boards of health have been established in 331 of the 883 organized municipalities of the provinces.

The presence of smallpox at a number of points in the Archipelago attracted attention to the subject of vaccination, and led to the adoption of an act providing for the compulsory vaccination of the inhabitants of the Philippine Islands, on December 2, 1901.

The receipt of numerous complaints that persons without adequate medical education were engaging in the practice of medicine led to the adoption on December 4, 1901, of an act regulating the practice of medicine and surgery in the Philippine Islands.

The other legislative measures recommended by the Insular Board of Health have not yet been considered by the Commission.

SERUM AND VACCINE INSTITUTES.

The urgent necessity for the production of large quantities of vaccine virus and of anti-plague and anti-rinderpestic serums led to the establishment, under the Board of Health, of an institute for the production of vaccine virus and of serums at Manila, and of a vaccine institute at Iloilo. It has been found advisable to abandon the latter institute, as experience has demonstrated the practicability of shipping vaccine virus on ice to all coast points in the Archipelago without serious danger of deterioration. A considerable amount of anti-pestic serum was also produced, but the outbreak of cholera made it necessary temporarily to detail Dr. J. W. Jobling, Director of the Serum Institute, for work in the Manila cholera hospitals, where he rendered invaluable service. Unfortunately he broke down physically under the long-continued strain and was granted leave of absence for recuperation in Japan. The work of the institute was, however, continued by Dr. Paul C. Freer, Superintendent of Government Laboratories, and Dr. Richard P. Strong, Director of the Biological Laboratory, as soon as cholera decreased sufficiently at Manila to relieve them of unusual demands upon their time. At present anti-rinderpestic serum is being successfully manufactured in quantities sufficient to immunize all cattle imported at Manila, and it is hoped soon to increase the output so as to enable the Insular Board of Health to immunize all cattle in the vicinity of infected areas throughout the Archipelago.

CONTAGIOUS DISEASE HOSPITALS.

The Commissioner of Public Health, by virtue of his office, exercises direct control over all hospitals for contagious diseases. He has exercised such control during the past year over the following institutions: The San Lazaro hospital, for lepers and for persons suffering from venereal disease; a plague hospital, a smallpox hospital, and three cholera hospitals, all in the city of Manila; and the leper hospital at Palestina, in the Province of Ambos Camarines.

The Commissioner of Public Health was further directed to proceed to Cebu and assume control over the leper hospital at that place, but the appearance of Asiatic cholera when he was about to sail led to the withdrawal of these instructions, which have not been renewed, as a plan for the segregation and care of all lepers in the Archipelago upon the Island of Culion is ready for submission to the Commission.

SPECIAL WORK OF THE BOARD IN MANILA.

The Insular Board of Health acts as the health board for Manila. In this capacity it has recommended to the Municipal Board many health ordinances, nearly all of which have been adopted. The lack of a sewer system or of any adequate means for the disposal of human excreta is a standing and serious menace to the public health of Manila. By direction of the Commission, the Board of Health has taken upon itself the disposition of the night soil of the city, so far as this can be collected with existing facilities, and it has perfected plans for the introduction of the so-called "pail conservancy system." Adequate appropriation has been made by the Commission for initiating the installation of this system, which has begun and is progressing favorably.

An immense amount of sanitary work has been done by the Board and its employees. Many of the worst districts of the city have been thoroughly cleaned and a strict inspection of the buildings of the city has been maintained.

EPIDEMICS.

The Insular Board of Health has been subjected to a severe and long-continued strain by the presence of bubonic plague in the city of Manila at the time of its organization, and by the cholera epidemic which began at Manila on March 20, 1902.

(a) BUBONIC PLAGUE.

Bubonic plague was discovered at Manila December 26, 1899, and slowly but steadily increased up to December, 1901, as will appear from the following table:

Months.	Cases.		
	1900.	1901.	1902.
January	18	7	0
February	48	27	1
March	64	63	2
April	54	111	0
May	22	137	0
June	19	35	0
July	13	39	0
August	18	34	0
September	6	8	0
October	7	8	0
November	1	0	
December	1	2	
	271	471	3

The deaths in 1900 numbered 199, and in 1901 reached a total of 432. The disease was at its worst each year during the hot, dry months of March, April, and May, nearly or quite disappearing during September, October, November, and December. It will be noted that the number of cases in 1901 exceeded that in 1900 by 200, while the number of deaths was about two and a half times as great, and the percentage of mortality among persons attacked increased from 73.4 in 1900 to 91.7 in 1901.

This heavy increase in plague for the year 1901 justified the apprehension that a severe epidemic would occur in 1902. Strenuous efforts were made to improve the general sanitary condition of the city, but the habits of the Chinese residents and of the lower class of Filipinos were such as to render the enforcement of proper sanitary regulations well-nigh impossible.

On account of the important part which house rats are known to play in the distribution of bubonic plague, a systematic campaign was inaugurated against these rodents in Manila. Policemen, sanitary inspectors, and specially appointed ratcatchers were furnished with traps and poison, and both traps and poison were distributed to private individuals under proper restrictions. A bounty was paid for all rats turned over to the health authorities, and stations were established at convenient points throughout the city where they could be received. Each rat was tagged with the street and number of the building or lot from which it came, was

dropped into a strong antiseptic solution, and eventually sent to the Biological Laboratory, where it was subjected to a bacteriological examination for plague. During the first two weeks 1.8 per cent of the rats examined were found to be infected. This proportion steadily increased, reaching the alarming maximum of 2.3 per cent in October. At this time numerous rats were found dead of plague in the infected districts, and, in view of the fact that epidemics of plague among the rats of a city in the past have been uniformly followed by epidemics among human beings, the gravest apprehension was felt, the rapid spread of the disease among the rats after the weather had become comparatively dry being a particularly unfavorable symptom.

It was deemed necessary to prepare to deal with a severe epidemic, and a permanent detention camp, capable of accommodating 1,500 persons, was accordingly established on the grounds of the San Lazaro Hospital. Hoping against hope, the Board of Health redoubled its efforts to combat the disease. The force of sanitary inspectors was greatly increased, and, under the able supervision of Dr. Meacham, their work was brought to a high degree of efficiency. Frequent house-to-house inspections were made in all parts of the city where the disease was known to exist. The sick were removed to the hospital if practicable; otherwise they were cared for where found and the spread of infection guarded against.

Plague houses were thoroughly disinfected and their owners were compelled, under the direction of the Assistant Sanitary Engineer, to make necessary alterations. Cement ground floors were laid, double walls and double ceilings affording a refuge for rats were removed, defects in plumbing were remedied, whitewash was liberally used, and, in general, nothing was left undone that could render buildings where plague had occurred safe for human occupancy. Buildings incapable of thorough disinfection and renovation were destroyed. Buildings in which plague rats were taken were treated exactly as were those where the disease attacked the human occupants. The bacteriological examination of rats enabled the Board of Health to follow the pest into its most secret haunts and fight it there, and was, I believe, the most important factor in the winning of the great success which was ultimately achieved.

With very few exceptions, there was no recurrence of plague in buildings which had been disinfected and renovated. As center after center of infection was found and destroyed, the percentage

of diseased rats began to decrease, and in January, 1902, when, judging from the history of previous years, plague should have again begun to spread among human beings, there was not a single case. In February 1 case occurred. In March there were 2 cases, as against 63 in March of the preceding year, and before April the disease had completely disappeared.

This result, brought about at a time when the epidemic would, if unchecked, have reached its height for the year, marked the end of a fight begun by the Board of Health on the day of its organization, and prosecuted unremittingly under adverse conditions for seven months with a degree of success which, so far as I know, has not been equaled under similar conditions in the history of bubonic plague.

Especial credit is due to Chief Health Inspector Meacham for the ingenuity which he displayed in devising means for the destruction of rats and for the tireless energy with which he devoted himself to securing their adoption, and to increasing the efficiency of his force of inspectors, as well as to Drs. J. W. Jobling and Edward A. Southall and their assistants, who worked unremittingly at the uncongenial and dangerous task of making a bacteriological examination of rats, a large proportion of which were putrid, while not a few of them were infected with one of the most fatal of diseases. This work was of necessity conducted in the inadequate building in which it has been necessary temporarily to house the Bureau of Government Laboratories, in close proximity to the Civil Hospital. The fact that not a single case of infection occurred among the Laboratory force or the inmates of the hospital is sufficient commentary upon the care with which it was performed.

During 1901 plague appeared at several points in the provinces near Manila. Agents of the Board of Health were promptly dispatched to the infected municipalities and radical remedial measures were adopted, including in several instances the burning of infected buildings, the result being the complete disappearance of plague in the provinces as well as in Manila.

(b) THE CHOLERA EPIDEMIC.

On March 3, 1902, notification was received at Manila that Asiatic cholera had appeared at Canton, China, and on March 8 it was reported at Hongkong. As a considerable part of the green vegetables imported at Manila come from Canton and

its vicinity, the United States quarantine officer at Hongkong was immediately notified that no vegetables not certified to by him would be admitted, and an order absolutely forbidding the importation of green vegetables was issued by the Chief Quarantine Officer on March 19. Health inspectors were warned to be on the lookout for persons suffering from bowel trouble of a suspicious character.

On March 20 the Board of Health was advised that two patients at the San Juan de Dios Hospital were developing symptoms of Asiatic cholera. They were immediately visited by the Commissioner of Public Health, the Chief Health Inspector, the Superintendent of Government Laboratories, and by Dr. Strong, Director of the Biological Laboratory, who took specimens of their dejecta for bacteriological examination. Cultures were at once prepared and the following morning the presence of a comma bacillus was demonstrated in hanging-drop slides. Two more suspicious cases had developed during the night. In the absence of the Acting Civil Governor, I communicated to General Chaffee the fact that four cases of suspected cholera had occurred, and requested him to have an adequate force in readiness to proceed to the Mariquina Valley and protect the city water supply. On March 21 the characteristic "cholera red" reaction was secured from cultures. On March 22 Dr. Strong reported officially to the Commissioner of Public Health the presence of Asiatic cholera. Meanwhile additional cases were occurring with increasing frequency. General Chaffee was informed of these facts, and was requested to establish an armed patrol along the Mariquina River from the intake of the city water supply up to and beyond Montalban, the last town on the river. The distance from the intake to Montalban is about 12 miles, and the population inhabiting this part of the Mariquina Valley is estimated at 14,000. A considerable number of these people get their drinking water from the river, and a still larger number use it for bathing purposes and for washing soiled clothing. As many of the inhabitants are accustomed to make daily trips to Manila, the danger that they would take back cholera with them was manifestly great. In spite of a most stringent quarantine, cholera eventually broke out in the Mariquina Valley, but it was held closely in check, and, thanks to the efficiency of the river patrol, the water supply of Manila has been kept free from infection up to the present time. In achieving this well-nigh impossible result the

Army has made it possible to avert a general epidemic in Manila and has saved thousands of lives. The difficulties of the task can be appreciated only by those thoroughly familiar with the conditions which have been met, and the results accomplished bear eloquent testimony to the value of land quarantine.

CHOLERA WORK IN MANILA.

There are in Manila a large number of shallow wells in close proximity to water-closets and very likely to be infected by surface drainage. The Board of Health had been making detailed bacteriological examinations of these wells, condemning such as proved to be in a dangerous condition. Under the circumstances, it was deemed necessary to abandon this slow procedure. All wells were ordered closed. The work of closing them was pushed with great energy by Mr. J. L. Mudge, Superintendent of City Streets, Parks, Bridges, Docks, and Wharves, and as a result what subsequently proved one of the main sources of infection in many provincial towns was eliminated in Manila.

As soon as cholera was definitely known to exist, the officer in charge of the Government Ice Plant was directed to increase the output of distilled water to the limit, and the use of all water which could be spared from the Army distilling plant was secured. Transportation was obtained from the city as well as from the Army, and water stations were established in the markets, on the water front, on the most crowded thoroughfares, and in those districts of the city where the absence of city water and the closing of wells seemed likely to cause hardship. Distilled water for drinking purposes was distributed free of charge. The Chinese used it liberally from the outset. The more ignorant of the Filipinos at first imagined that the health authorities were attempting to poison them, but their fears were soon allayed, and as the demand for distilled water increased it became necessary to send two perambulating water carts of large capacity about the streets.

It was soon noted that the disease was nearly confined to what is known as the Farola (light-house) district, included between the Bay of Manila, the north bank of the Pasig River, and a tide creek connecting the Pasig with the Bay, where an aggregation of overcrowded and filthy shacks presented conditions favorable to its spread. For several days a strong effort was made effectively to

quarantine this district, but numerous persons escaped by water under cover of darkness. The conditions were such as to render thorough disinfection impossible. The disease spread rapidly among the imprisoned people and a continuation of the quarantine would have been inhuman. I therefore ordered the inhabitants removed to the San Lazaro detention camp and the district burned over. The removal was effected on March 25. Houses and such personal property as could not be disinfected were invoiced on the 26th, and burned on the 27th.

Cholera immediately developed in the detention camp, but the people confined there were kept under constant surveillance and those who began to sicken were immediately isolated, so that there was no spread of infection. The last case among the people of the Farola district occurred within forty-eight hours of their entering camp. They were ready to release five days thereafter.

For several days after the Farola district was burned there was a decided decrease in the number of cases of cholera, but the cases which did occur were widely scattered over the city, and investigation showed that in most instances the persons attacked had escaped from the Farola district while we were attempting to quarantine it. Cholera also began to develop in the municipalities about the Bay, where it was carried by persons escaping from this district in small boats. I believe that if the measures finally resorted to had been taken three days sooner the epidemic might have been averted. Later experience in provincial towns has fully demonstrated the efficacy of radical measures if promptly adopted.

The disease was very malignant, more than 90 per cent of the early cases resulting fatally. General Chaffee was asked to furnish medical officers, and gave us every physician he could spare. The city was divided into twelve sanitary districts, each in charge of a medical officer with 30 to 60 men under him. The sale of fruits, vegetables, and foods likely to carry cholera was prohibited, and a rigid inspection established over markets, restaurants, and shops where articles of food were sold or consumed. House-to-house inspection was kept up day and night. All cholera cases discovered were removed to cholera hospitals if practicable, and contacts, if found, were taken to a detention camp. Cholera houses were quarantined until they could be disinfected. At first nipa shacks were burned in many instances. This practice provoked great

hostility among the poorer people, and was later abandoned in favor of thorough disinfection.

Autopsies were made upon all supposed cholera victims, in order that diagnosis might be certain and that the possibility of unjustly detaining persons as cholera contacts might be avoided. This dangerous work was performed by Dr. Richard P. Strong, Dr. J. W. Jobling, and Dr. J. B. Thomas, assisted by Mr. Norman Williams.

Relatives were allowed to claim their dead and bury them in quicklime, under the supervision of health officers, but bodies not claimed within twenty-four hours were cremated.

CHOLERA HOSPITALS AND DETENTION CAMPS.

Fortunately a well-equipped permanent detention camp, capable of accommodating 1,500 people, had been constructed in anticipation of an epidemic of bubonic plague, and was available at the outset. The capacity of this camp was materially increased by the erection of tents purchased from the Army. A detention hospital for the contacts who showed signs of illness and a cholera hospital for those who developed cholera in the detention hospital or elsewhere in the city, were established in tents near the detention camp upon the San Lazaro Estate.

Great difficulty was experienced in organizing a satisfactory cholera hospital and in securing competent physicians and nurses for it. Two physicians were tried and found wanting. Drs. J. W. Jobling and T. K. Hunt, who had organized a very successful emergency hospital in the Farola district, were then put in charge, and proved to be admirable men for this trying and dangerous post. Surrounded by the dying and the dead, they worked unremittingly for the lives of their patients for four weeks, relieving each other every twelve hours. At the expiration of this time they were both completely worn out, and it was necessary to vacate the hospital for thorough disinfection.

Male nurses were secured without difficulty and faithfully and courageously performed their duties. No female nurses could be obtained until March 28, when Miss Anna M. Seagran and Miss Marie A. Kolp volunteered. The following day Miss Elsie Weinberg also volunteered. The presence of these brave and efficient women was a blessing to the patients, and resulted in greatly im-

proving the condition of the hospital, which soon became as satisfactory as a tent hospital in the tropics can be made. The strain to which everyone connected with this hospital was subjected can be appreciated only by those who have seen Asiatic cholera at its worst. The last offices for the dying were necessarily performed by the physicians and nurses, as no minister of the gospel, Protestant or Catholic, ever visited the place.

Before the San Lazaro detention camp and cholera hospital became full, a detention camp for persons desiring to leave Manila, a detention camp for cholera contacts, and a cholera hospital were established at Santa Mesa upon high ground, the use of which for this purpose was generously donated by Señor Juan M. Tuason. Here, as at San Lazaro, difficulty was at first experienced in getting a suitable man to take charge, but under the very able administration of Dr. Thomas R. Marshall work at the Santa Mesa camps and hospital was soon brought to a high degree of efficiency.

Meanwhile the Spanish residents had requested and received permission to establish a hospital where they might be cared for by their own physicians, under general supervision of the Insular Board of Health, and had secured the spacious building formerly used by the Army for the Second Reserve Hospital. They had expended a large sum in properly equipping this building, and a corps of Spanish physicians, friars, and sisters of charity was in attendance. This institution was named the Santiago Hospital.

As our cholera hospitals in tents were necessarily unsatisfactory, the Commissioner of Public Health requested permission to use a considerable part of the Santiago Hospital, which afforded far more space than was required by the sick among the Spanish population. His request was promptly granted by the public-spirited gentlemen in charge, and this institution, which affords good accommodations for Spaniards, other Europeans, Filipinos, and Americans, with separate wards for the different nationalities and the two sexes, has been a most important factor in the saving of life. The building is large, cool, well ventilated, and easily disinfected. It stands at the center of a lot of some 29,000 square meters, inclosed by a high wall, and, although this lot is located in the populous district of Malate, the isolation of the building is complete.

OPPOSITION TO CHOLERA WORK IN MANILA.

As was to be anticipated, the rigorous measures against cholera enforced by the Insular Board of Health provoked bitter opposition from the first. For weeks the presence of cholera was denied by ignorant, misinformed, and ill-intentioned persons. The more ignorant Filipinos refused to believe in its existence because the daily deaths did not reach up into the thousands. The minds of the common people were poisoned by tales of horrible abuses in the detention camps, and of deliberate murder of patients at the cholera hospitals. The story was widely circulated that the houses of the poor were burned in order to make room for the future dwellings and warehouses of rich Americans. These absurd tales gained credence among the populace, and, together with some actual abuses committed by ignorant, inexperienced, or overzealous health inspectors, produced a state of popular apprehension which proved a very serious factor in the situation, as it led to the concealment of the sick, the escape of contacts, and the throwing of dead bodies into the esteros and the Pasig River, the polluted waters of which were fruitful sources of infection.

Unfortunately, the opposition was by no means confined to the more ignorant classes. At the outbreak of the epidemic a mass meeting of the Spanish and Filipino physicians was held. When asked whether they would coöperate with the Board of Health, they without exception promised to do so. I regret, however, to record the fact that, with few exceptions, they not only failed to give active assistance, but in many instances, by neglecting to report cholera cases, by falsely reporting them, and by decrying the sanitary measures deemed necessary by the authorities, added materially to the crushing burden which rested upon the Board of Health. I take pleasure in calling attention to several noteworthy exceptions to this general rule. Dr. Ariston Bautista Lim, the ablest of the Filipino physicians of this capital, neglected his private practice and devoted much valuable time to assisting the Insular Board of Health, both in the city and in the provinces. His services were invaluable. Dr. Manuel Gomez, Secretary of the Board of Health, did a large amount of investigation and emergency work, and I desire to commend him and Dr. Luis Abella, a chief medical inspector, not only for the efficiency with which they dis-

charged the duties assigned them, but for their valuable services in helping to allay ungrounded popular apprehension.

When it became known that the Santiago Cholera Hospital was to be established I was visited by the heads of two important Bureaus of the Government, who presented petitions against my proposed action signed by numerous Government officers and employees. Declining to accede to these petitions, I was later threatened with injunction proceedings. In this connection it is worthy of note that not a single case of infection has been traceable to the Santiago Hospital, which saved the lives of many Americans, including one of the petitioners against its establishment.

RESULTS OF CHOLERA WORK IN MANILA.

The measures enforced by the Board of Health in Manila were strikingly successful for months. With its congested population, its lack of any adequate system for the disposal of human excreta, and its many unsanitary districts, the city affords a natural breeding ground for cholera. The maximum of daily cases during the first three months was 38, on May 1, and when this maximum had been reached a steady decline began. During the second week of May the drop was so marked as to lead the Commissioner of Public Health to believe that the end of the epidemic was at hand, and on May 16 he made wholesale reductions in the force of sanitary inspectors and emergency employees. This action was disapproved by the remaining members of the Board, but as the disease continued to decrease for some days after the reduction, the logic of events at first seemed to justify his action.

Within a short time, however, there began a slow but steady increase in the daily cases. This increase was called to the attention of the Commissioner of Public Health by me when the daily cases reached 12, and again when they reached 20 to 25. When they rose to 36, on June 20, he was warned that the situation was becoming serious. He did not so regard it, but was nevertheless instructed that energetic measures must be adopted. At this time I was compelled by ill health to go to the mountains of Benguet for five weeks. During my absence the number of daily cases increased quite steadily until July 26, when 91 were recorded, this proving to be the maximum for the epidemic in Manila.

On July 31 the detail of Colonel Maus as Commissioner of Public

Health terminated. From the day of his appointment to this position he had worked with tireless energy, sacrificing himself as few men would have been willing to do for the public good. From the beginning of the cholera epidemic he had been subjected to a heavy and continuous strain, which, at the time he was relieved, had resulted in extreme mental and physical exhaustion. I desire to express my deep appreciation of the faithfulness and energy which he displayed in the discharge of his duties while Commissioner of Public Health.

On August 1 Dr. Frank S. Bourns, who had been Chief Health Officer of Manila for more than a year under military rule, and whose long residence in the Philippines had peculiarly fitted him to deal successfully with the Filipinos, was temporarily appointed Commissioner of Public Health by the Acting Civil Governor, and sacrificed his private interests in order to undertake a thankless task at a critical time.

The opposition of the Spanish and Filipino physicians had reached a climax at the time of his appointment. By making certain changes in policy he succeeded in allaying to a large extent the hostility of the Filipino physicians, and in securing from them a considerable degree of coöperation. During the four weeks from July 6 to August 2 there were 1,222 cases of cholera in Manila. During the four weeks ending August 31 the number of cases fell to 668; during the month ending September 30 it was 296, and during the month ending October 31 it was 88. The total number of cases in the city from the beginning of the epidemic to date has been 4,114. Estimating the inhabitants at 302,000, 1.38 per cent of the population have been attacked. In view of the fact that nowhere in the Archipelago are conditions so favorable to a great epidemic, the value of strictly enforced sanitary measures is strikingly shown by contrasting this result with what has occurred in many of the provincial municipalities where the disease appeared at a much later date than at Manila, but where time was lost in enforcing the necessary health regulations or where it was impossible to enforce them at all. In Hagony 21.6 per cent of the population was attacked; in Macabebe, 32 per cent; in Orani, 18.7 per cent; in Dumangas, 13.9 per cent. Other towns from which reliable statistics are not yet at hand are reported to have suffered still more severely.

THE EPIDEMIC IN THE PROVINCES.

During the early days of the epidemic quarantine guards were placed on all roads, paths, and streams leading out from Manila, a water patrol was established on the Bay, and all vessels leaving Manila were quarantined five days at Mariveles, and for a longer period if cholera developed on board. No one but a health officer could lawfully leave the city without a pass. The spread of the disease to the provinces was thus greatly retarded and its transmission by large vessels leaving Manila was almost entirely prevented, but it was carried by native canoes to the towns about the Bay, and was then widely disseminated by small sailing vessels, the movements of which could not be controlled. Furthermore, it was impossible to prevent the escape overland of people by night, or even by day, if they chose to make their way through the fields. What General Otis could not accomplish with thousands of soldiers was an impossibility for the Board of Health aided by the city police and a few hundred men from the Insular Constabulary.

Cholera appeared in the provinces as follows: Bulacan, March 23; Cavite, March 27; Bataan, March 28; Ambos Camarines and Rizal, April 2; Laguna, April 7; Pampanga, April 13; Pangasinan, April 24; Tarlac, April 28; Nueva Ecija, May 8; Leyte, May 9; Batangas, May 24; Samar, May 29; Mindoro, June 10; Tayabas, June 13; Zambales and Marinduque, July 1; Benguet, July 4; Cebu, July 14; Union, July 15; Western Negros, August 26; Iloilo, August 28; Surigao, September 5; Capiz, September 8; Eastern Negros, September 29; Misamis and Antique, October 2; Sorsogon, October 15; Romblon, October 31. In each new region where the disease appears it is very malignant at first, spreading rapidly and causing a very high mortality, but with the lapse of time it tends gradually to decrease in intensity, and finally to disappear.

The strain imposed upon provincial and municipal boards of health by the appearance of cholera so soon after their organization was necessarily very severe. In some cases they have responded to it nobly, and in others they have gone down under it. The Insular Board of Health has done all in its power to check the epidemic in the provinces by furnishing medicines and disinfectants and by sending experienced medical officers to those places where the situation has become most serious. Invaluable assistance has

been rendered in the provinces, under orders from General Chaffee, by the Army surgeons, who, with few and insignificant exceptions, have coöperated heartily with the civil health authorities where any existed, and have taken entire control and fought a good fight in many places where there were no local civil health officers. The efficacy of proper sanitary measures has been demonstrated over and over again by the prompt and complete stamping out of cholera in provincial municipalities where the population is uniformly much less congested than in Manila. The disease has now practically disappeared from the Provinces of Bulacan, Pampanga, Bataan, Rizal, Ambos Camarines, Marinduque, Tarlac, Laguna, Batangas, Nueva Ecija, Zambales, Cebu, Pangasinan, North and South Ilocos, Leyte, and Union. It is still raging with considerable violence in the Province of Iloilo.

The total number of cases reported in the provinces up to date is 103,076, with 66,837 deaths. Adding the 4,174 cases and the 3,146 deaths which have occurred in Manila, the grand total for the epidemic up to date is 107,250 cases and 69,983 deaths, the mortality being 65.25 per cent.

The following table shows in summary form the progress of the epidemic:

Month.	Manila.			Provinces.			Total.		
	Cases.	Deaths.	Mortality.	Cases.	Deaths.	Mortality.	Cases.	Deaths.	Mortality.
March 20 to 31, inclusive.	102	95	<i>Per cent.</i> 93.13	12	10	83.33	114	105	<i>Per cent.</i> 92.10
April -----	495	480	96.96	1842	1344	72.96	2,337	1,824	78.04
May -----	529	330	62.38	2,568	1,765	68.73	3,097	2,095	67.64
June -----	582	442	75.94	5,284	4,131	78.16	5,866	4,573	75.95
July -----	1,385	976	70.48	7,737	5,826	75.30	9,122	6,802	74.56
August -----	697	525	75.32	11,214	8,064	71.91	11,911	8,589	72.10
September -----	296	232	78.37	43,188	27,285	63.17	43,484	27,517	63.28
October -----	88	66	75.00	31,231	18,412	58.95	31,319	18,478	58.99
Total -----	4,174	3,146	75.34	103,076	66,837	64.84	107,250	69,983	65.25

DEATH OF DR. MEACHAM.

On April 14 the Board of Health suffered a very serious loss in the death of Dr. Franklin A. Meacham, Chief Health Inspector, who had borne the brunt of the fight against bubonic plague and from the beginning of the cholera epidemic had displayed tireless energy in his efforts to combat the new enemy. Although suffering from a high fever, he had for several days continued to expose him-

self to the intense heat of the sun by day and to work in his office until late at night, keeping his colleagues in ignorance as to his true condition. He gave up only when unable to rise from his bed, and died three days later of heart failure, which was the result of utter exhaustion from long-continued overwork. Dr. Meacham was an able administrator, and was endowed with the faculty, as valuable as it is unusual, of discharging disagreeable duties in such a way as to win not only the respect but the regard of those most injuriously affected. He sacrificed his life in the discharge of his duty, and his death was an irreparable loss.

DEATH OF MR. J. L. MUDGE.

Six days later the Board suffered another disaster in the death of Mr. J. L. Mudge, the efficient City Superintendent of Streets, Parks, Bridges, Docks, and Wharves, who had rendered invaluable aid in closing the wells, in cleaning up those regions where cholera was most prevalent, and in the establishment of detention camps and cholera hospitals. He had been warned in writing by his physician that his life was in danger and had been ordered to go to the hospital, but had refused to give up his work at this critical time. The strain was too much for him, and on April 20 he passed quickly away from heart disease.

SPECIAL MENTION OF THE SERVICES OF OTHER HEALTH OFFICERS.

Before closing my discussion of the cholera epidemic I wish especially to call attention to, and commend, the following gentlemen: Dr. Chas. F. de Mey, for stamping out cholera in the provincial towns of Macabebe, Hagonoy, and Bacolor, and for his efficient services in one of the worst districts in the city of Manila; Dr. Frank W. Dudley, for his efficient work while in charge of the San Lazaro detention camp, and in fighting cholera at Orani and in the northern coast provinces of Luzon; Dr. Edward A. Southall, for his fine work, first, in his district in the city of Manila, and, second, while in charge of the Santiago Cholera Hospital, where he broke down physically as a result of the severe and long-continued strain; Drs. F. J. Combe, George A. Zeller, Isaac W. Brewer, and Henry E. Winslow, for their valuable and most efficient services in the city of Manila. I have previously made special mention of the work of Drs. Thomas R. Marshall, J. W. Jobling, and T. K. Hunt.

One of the most serious difficulties encountered, both in Manila and in the provinces, has been the securing of efficient inspectors. In too many cases the Filipino inspector does not himself appreciate the importance of the measures which it is his duty to enforce. He is unable to understand that these measures, to be made effective, must be enforced upon the rich as well as the poor, and the strong as well as the weak. In order to get satisfactory results from Filipino inspectors it has usually proved necessary to have them closely supervised by Americans. The cholera epidemic extended over the period of the long annual school vacation and necessitated the closing of the schools in many municipalities at times when they would under normal conditions have been in session. As a rule, the teachers remained at their posts through the worst of the epidemic, and many of them rendered invaluable assistance to insular and provincial health officers by their wise, courageous, and energetic work in the municipalities. They aroused municipal officers to the imperative necessity of improving the sanitary condition of their municipalities before the scourge was upon them, and when it came voluntarily took up the disagreeable and dangerous task of searching out the cholera victims, quarantining the living, nursing the sick, and supervising the burial of the dead. I saw them at their work in the Provinces of Bataan, Pampanga, Tarlac, Pangasinan, and Union, and found them doing their duty effectively and unassumingly. Their services were invaluable, both from the direct results which they accomplished and from the far-reaching effect of the good example which they set. Mr. William H. Badger, of Malasiqui, Pangasinan; Mr. Robert R. Jamison, of Balanga, Bataan; Mr. Herbert Lucker, of San Miguel, Ilocos Norte, and Mr. R. Zumstein, of Nagcarlang, Laguna, paid for their devotion to duty with their lives.

The Insular Board of Health and the Insular Government are greatly indebted to Dr. S. Kitasato, Director of the Imperial Institute for Infectious Diseases at Tokio, Japan, for the large amount of useful information which he has furnished with reference to means of combating bubonic plague; for the courteous treatment and assistance accorded by him to the Director of the Serum Institute and the Superintendent of Government Laboratories while in Japan; and, in general, for his interest and hearty coöperation in the work of the Insular Board of Health, the Serum Institute, and the Bureau of Government Laboratories.

For further details of the work of the Board of Health for the Philippine Islands, reference is made to the report of Colonel Maus, former Commissioner of Public Health. In justice to Colonel Maus it should be stated that owing to the pressure of work incident to the cholera epidemic, and to the fact that he sailed for the United States almost immediately after his detail as Commissioner of Public Health ceased, he did not have time to prepare a proper report. The material which he got together has necessarily been revised by others, and the report as finally submitted conveys an imperfect idea of the work of the Board from September 1, 1901, to July 31, 1902.

Attention is particularly invited to the cholera statistics contained in the report of Dr. Frank S. Bourns, covering the period from August 1 to August 31, 1902, during which time he served as Commissioner of Public Health. It is hoped that at some future time when the cholera epidemic is over a full report upon it may be published.

THE QUARANTINE SERVICE.

Under the efficient management of Dr. J. C. Perry, Passed Assistant Surgeon, U. S. M. H. S., Chief Quarantine Officer for the Philippine Islands, the most modern and best-equipped quarantine station in the Orient has been constructed at Mariveles Harbor at the mouth of Manila Bay. Ships of the largest size can come directly alongside the wharf, which is 400 feet long and 45 feet wide. The plant has sufficient capacity to allow the disinfecting of 150 passengers and their baggage every hour. The station is amply equipped for the detention of suspects, three barracks so arranged as to provide for six segregation groups being available for this purpose. Eighty cabin and a thousand steerage passengers can be cared for in these barracks at one time.

An effective quarantine service is of the greatest importance to these Islands, which are constantly menaced by the danger of infection from the breeding grounds of disease afforded by the large neighboring centers of population in China. The presence of cholera and bubonic plague upon the Asiatic coast and in this Archipelago has greatly increased the always onerous duties of the quarantine officers at Manila, which have been faithfully and efficiently performed. The boarding officer at Manila has been on duty continuously every day from 6 a. m. to 6 p. m., and the officer in charge of the station at Mariveles has often been on duty from 5 a. m. to 11 p. m. The clerical force has also been overworked.

During the fiscal year ending June 30, 1902, the effects of 33,387 passengers returning to the United States, including 110,317 pieces of large baggage, have been disinfected at the Manila and Mariveles stations; 12,158 persons have been detained for a period of five or more days, and 382 vessels have been disinfected.

Officers of the Marine-Hospital Service are stationed at Cebu and Iloilo, and the system of inspection at these ports is similar to that at Manila.

The quarantine work at Zamboanga and Joló, where comparatively few foreign vessels enter, has been performed by surgeons of the United States Army.

Aparri has recently been made a port of entry, and on account of its proximity to Hongkong and Amoy, a quarantine officer should be detailed for duty there.

Floating disinfecting plants for Cebu and Iloilo have been equipped during the year, at a total cost of \$40,000.

Every effort was made by the quarantine officers at Manila to prevent the introduction of cholera from Canton and Hongkong after it was reported there. It seems certain that it was not brought in by passengers, nor were vegetables which could have brought it allowed to be landed. After the order forbidding the importation of fresh vegetables had been issued a number of unsuccessful attempts to evade it were made. The temptation to smuggle vegetables into Manila was strong on account of the high prices which they brought at this time, and it is not improbable that other efforts to evade the quarantine regulations in this respect may have been successful. It is known that condemned vegetables were thrown into the Bay in defiance of the orders of the Chief Quarantine Officer, and that they were washed up on the beach at the Farola district and eaten by the inhabitants. I deem this to be the most probable explanation of the introduction of cholera.

For a fuller description of the Mariveles quarantine station and further details of the work of the quarantine officers in the Philippines during the past year, reference is made to the report of the Chief Quarantine Officer for the fiscal year ending June 30, 1902, and to his monthly reports of July and August of the same year.

CIVIL HOSPITAL.

The importance of furnishing adequate medical attendance for civil officers, employees, and members of their families was realized at an early date by the Commission, and it was deemed advisable to employ regularly an attending physician and surgeon and an assistant to care for them. Much difficulty was experienced in giving proper attention to persons seriously ill at their homes. Trained nurses could not be had at prices within the means of employees drawing small or moderate salaries, if indeed they could be had at all. Equal difficulty was experienced in providing suitable food for those who required special diet, while the character of many of the private houses was such that surgical operations performed in them would necessarily have been attended with grave danger of infection. Under these circumstances the establishment of a hospital for the proper treatment of civil officers and employees became imperative.

The overcrowding of the city made it most difficult to secure a suitable building, and dependence was temporarily had upon the small Women's Hospital, founded by Mrs. Whitelaw Reid, but the number of beds available at that institution was far from sufficient to meet our needs, while the charges were so high as to be prohibitive for many of our employees.

The building which was finally secured by the Civil Government had been used as a barrack and was in bad condition, but it was thoroughly cleaned and renovated, and a well-equipped modern hospital of eighty beds has been established there.

Shortly after the outbreak of cholera a building adjacent to the main hospital was secured and has since been utilized as an isolation ward for persons showing symptoms of, or suffering from, contagious diseases. Fortunately no contagious diseases developed at the hospital prior to the renting of this building. Since it has been secured there have been cases of measles, smallpox, and cholera among the patients.

The Civil Hospital has an attending physician and surgeon, an

assistant attending physician and surgeon, a house physician, and a staff of most efficient nurses and hospital stewards. It is open to all civil officers, employees, and members of their families whether resident in Manila or in the provinces. Patients who desire treatment in private rooms are charged \$2.50 per day, while those who receive treatment in the wards are charged \$1 per day. These charges cover board, medical attendance, and nursing. Persons whose annual salary is less than \$480 are entitled to free treatment. The institution is thus made available for all servants of the Government.

Emergency cases of whatever sort are received at the hospital and given free treatment until their removal can be safely effected. When the number of empty beds exceeds five, civilians other than officers or employees of the Government may be received upon the payment of prescribed fees and may employ their own physicians, but if they desire treatment by the attending physician and surgeon must compensate him for his services.

From its inception the Civil Hospital has been of great use. Admission of patients began on October 12, 1901, since which date there have been admitted 1,428 patients, of whom 1,138 were Americans or Europeans and 290 were Filipinos. Since the appointment of the attending physician and surgeon in August there have been treated as "sick in quarters" civil officers, employees, and members of their families to the number of 2,410. The total number of patients treated during this period, in and out of the hospital, has been 3,838. There have been but 13 deaths, a record which is most creditable to everyone connected with the institution. The attending physician and surgeon reports that 112 cases of dysentery, 36 of which were amebic, have been treated, and that only one has resulted fatally during the time they were under treatment.

The Government is obliged to pay a very high rent for the buildings occupied, which at the best are but indifferently adapted to hospital purposes and are situated in the immediate vicinity of low ground which can not be drained. A modern building on high ground is greatly needed, and should be provided as soon as funds are available to meet the cost of its erection.

For further information in regard to the Civil Hospital, reference is made to the first annual report of the attending physician and surgeon.

CIVIL SANITARIUM AT BAGUIO, BENGUET.

During the past year it has been possible to conduct some practical experiments as to the effect of the Benguet climate upon sick or debilitated persons. The opportunity presented itself to acquire a considerable tract of land with two houses upon it, owned by Mr. Otto Scheerer. The position of this land with reference to the probable future site of Government buildings at Baguio was such as to make it seem desirable that the Government should purchase it before further improvements were made upon it. One of the houses was assigned to the governor of the province as his official residence. The other, containing a dining room, a kitchen, and three bed rooms, with a total capacity of eight beds, was taken for a hospital. With considerable difficulty the necessary furniture and hospital supplies were sent up over the Naguilian trail, and the institution was opened with a personnel consisting of an acting superintendent, a nurse, a hospital steward, and the necessary servants. Later another nurse was added.

Plans were prepared for a new building to accommodate sixty beds, and to be constructed in such a way that the old building would form a part of it. The construction of six cottages, to be occupied by the families of civil officers and employees in need of recuperation, was also provided for. Work upon the projected improvements was begun immediately. Progress has necessarily been slow, as lumber could be had only by felling pine trees and sawing them up by hand, while it was necessary to take other supplies in over the Naguilian trail.

Very sick persons could not have endured the long, rough trip over the trail, but it has been possible to send a limited number of malaria patients and persons convalescing from dysentery and other wasting diseases. Forty-three persons have thus far been admitted to the sanitarium. A few of these were in good health and were members of the families of the real patients. Approximately four-fifths of those admitted sought relief from general debility, induced by the tropical climate or by wasting diseases,

and in nearly every instance they reacted promptly to the bracing air and rapidly improved. We now know positively what we had every theoretical reason to believe would prove true: that convalescents gain rapidly in weight, strength, and color at Baguio, and are soon restored to vigorous health. In some instances slight discomfort is felt during the first few days owing to the change in altitude, but this soon passes away.

The first estimate of the time required to complete the cottages and the addition to the sanitarium building proved inaccurate. Owing to strikes among the workmen, cholera, bad transportation, the extraordinary rainfall during the month of August (54 inches), and scarcity of labor, progress was much slower than had been anticipated. The force of nurses and hospital attendants, based on this estimate, proved unnecessarily large, and it became evident that if patients, even when convalescent, were to be sent to Baguio there must be a physician and surgeon there to attend them. Act No. 429 was accordingly adopted, reducing the original force to one nurse, one hospital steward, one cook, and two native servants, and providing for the appointment of an attending physician and surgeon.

Many of the persons who have been at Baguio are anxious to secure building lots there in order that they may erect cottages and send their families to Benguet during the hot season. The establishment of homes where the families of civil officers and employees can at any time, and at small expense, get the beneficial effects of a bracing climate will greatly add to the stability of the civil service, and I urge the surveying of a town site on Government land and the sale of building lots in the near future, in order that it may be possible for those who desire to do so to build at Baguio. When this can be done many persons who now hesitate to bring their families to the Philippines will feel perfectly safe in sending for them.

For further details in regard to the work of the Civil Sanitarium, reference is made to the first annual report of the attending physician and surgeon.

A year's meteorological observations have furnished the following data with reference to the climate at Baguio: February, with a mean temperature of 62.1° Fahrenheit, is the coldest month. The temperature rises rapidly in March, reaching its maximum for the

year in April, which has a mean of 70.5° . A second minimum occurs in August, which has a mean of 64.6° . The temperature again rises slightly in October and November, falling from that time until February. It is always from 12 to 16 degrees cooler at Baguio than at Manila, as is shown by the following table:

Table of mean temperatures at Manila and Baguio.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Manila -----	77.0	77.7	80.4	82.9	83.3	82.0	80.8	80.8	80.4	80.8	79.0	77.4
Baguio -----	63.5	62.1	66.9	70.5	68.3	67.2	66.5	64.6	67.0	67.6	66.0	64.3
Difference -	13.5	15.6	13.5	12.4	15.0	14.8	14.3	16.2	13.4	13.2	13.0	13.1

The maximum temperature for the year, 82.8° , occurred on April 19. This is slightly higher than the maximum temperature with which Baguio has been credited. The minimum for the year, 42.1° , was recorded February 18.

The relative humidity was slightly greater at Baguio than at Manila, except during the months of October and November, when it was less. By months it was as follows: January, 76; February, 79; March, 76; April, 74; May, 86; June, 90; July, 89; August, 93; September, 90; October, 83; November, 82; December, 84.

Except during the months of July, August, and September, the mornings were almost uniformly free from fog. It is an interesting fact that for every month of the year there is less cloudiness at Baguio than at Manila. The rainfall by months, in inches, was as follows: January, 0.06; February, 0.57; March, 1.46; April, 0.32; May, 4.02; June, 12.55; July, 15.43; August, 37.03; September, 11.90; October, 4.95; November, 2.52; December, 5.47; total, 96.28. It will be noted that January, February, March, and April are very dry, the greatest dryness occurring at the time of greatest heat, in April. June, July, August, and September are wet, and moderate rains occur during October, November, December, and May.

These facts fully confirm the information previously secured by the Commission with reference to the climate of Baguio.

THE PROPOSED LEPER COLONY.

There are three leper hospitals in the Philippines, situated at Manila, Palestina, and Cebu, respectively. During the past year a beginning has been made toward taking a leper census of the Islands. This census is already quite complete for many of the provinces, and its results lead to the conclusion that the estimate of those persons who have heretofore expressed the belief that there were 30,000 lepers in these Islands is wide of the mark. It is believed that the total number will not exceed 10,000, and it may fall considerably below this figure.

The desirability of establishing a colony where persons in the early stages of leprosy can have their homes, cultivate the soil, and in general lead a free, out-of-door life, instead of being practically imprisoned and compelled to pass their days in company with fellow-unfortunates in the last stages of this horrible disease, has long been appreciated by both military and civil authorities. Efforts were made by the military government to find an island suitable for the establishment of a leper colony, and a military board reported favorably on the Island of Cagayan de Joló after somewhat cursorily examining it. As satisfactory information was not given concerning the supply of drinking water on this island, and as the accuracy of the board's report that there were but two or three hundred inhabitants had been seriously questioned, a committee, consisting of the Commissioner of Public Health, the Sanitary Engineer, and the Secretary of the Interior, was appointed to reëxamine the island, and if it did not prove satisfactory to search for a more suitable one.

This committee reported adversely on the Island of Cagayan de Joló, on account of the entire lack of a favorably situated supply of drinking water, the absence of any port, and the presence in the island of some three thousand Moros, whose removal would have been both difficult and expensive, and recommended the Island of Culion, in the Calamianes Group, on account of its healthful climate, rich soil, extensive cattle ranges, abundant water supply, good harbors, and small population. The present

inhabitants are so few and have so little property that their removal, if deemed necessary, can be effected with little difficulty and at small expense.

For further information as to the Islands of Cagayan de Joló and Culion, reference is made to the report of this committee.

An appropriation of \$50,000 was included in Act No. 389, for the purpose of erecting a warehouse on Halsey Bay, building a road to the proposed site of the colony, and erecting superintendent's house, hospital, and 100 separate dwellings for lepers, the hospital and dwellings to be of bamboo and nipa palm, which the Island of Culion produces in abundance. Unfortunately the cholera epidemic prevented the prosecution of this work, and the appropriation lapsed at the end of the fiscal year. A new appropriation was made in October, and it is hoped that the colony may be established and the inmates of the San Lazaro, Palestina, and Cebu lazarettos transferred to it during the coming dry season.

THE FORESTRY BUREAU.

The work of the Forestry Bureau has progressed without interruption during the past year. The Chief of the Bureau, Capt. George P. Ahern, Ninth United States Infantry, was absent on leave in the United States from May 18 until December 1, 1901. During this period the affairs of the Bureau were ably directed by its assistant chief, Mr. Albert E. McCabe, who has recently severed his connection with it, greatly to my regret, in order to engage in the practice of law. Mr. McCabe has a good legal training, combined with executive ability, thorough familiarity with extensive lumbering operations as carried on in the United States, and with the methods in vogue in these Islands, and his place will be difficult to fill.

The visit of the Chief of the Bureau to the United States resulted in securing the services of a number of valuable men, and since their arrival extensive field operations have been undertaken in order to ascertain the character and amount of timber in the Provinces of Bataan, Tayabas, and Ambos Camarines, and in the Island of Mindoro.

The method followed in estimating timber is to select and measure "average acres." A detailed study of each such acre is then made, the stand and varieties of timber, their peculiarities of growth, the character of the soil, rock formations, etc., being considered. Valuation surveys have already been made for 600 such acres in Bataan Province.

The surveys thus far completed show an average stand per acre of 7,000 cubic feet of marketable timber (over 20 inches in diameter), and the statement that there is an average stand of 3,500 cubic feet of such timber per acre of the 20,000,000 acres of virgin forest estimated to remain in this Archipelago would probably be conservative.

A well-equipped timber-testing laboratory has been established at Manila and important practical experiments for the purpose of ascertaining the qualities of the different Philippine woods are now in progress. No systematic series of properly conducted tests

has heretofore been made, even upon those of our woods which are best known, and the practical importance of this work is very great, as it will doubtless result in bringing into commercial use many varieties of wood which are not marketable to-day because their properties are unknown.

The timber cut and marketed in these Islands during the past year has been entirely insufficient to meet the local demand. It has been necessary to import millions of feet of American pine and redwood and of timber from Borneo and Australia. Between May 4 and August 12, 1902, the price per cubic foot of ipil increased from \$0.95 to \$2, United States currency; that of molave from \$1.10 to \$1.80, and that of tindalo from \$0.95 to \$2. It is often impossible to purchase our best hard woods at any price, and any surplus in the near future will be promptly absorbed by the China market. The lack of suitable means for transporting logs is the main cause of the existing shortage of lumber. The carabao, which is the only draught animal in the Islands capable of hauling logs, is unsatisfactory at the best, and a large percentage of these animals have recently died of rinderpest. The lumber company which first successfully introduces modern logging methods here will make very handsome profits.

INCREASE IN WORKING FORCE.

The working force of the Forestry Bureau has been materially increased during the year, and divisions of inspection, of forest management, and of botany, have been created. The efficiency of the work of the division of inspection is shown by the increasing revenues derived from the dues collected on forest products.

BOTANICAL COLLECTIONS.

Extensive botanical collections have been made during the past year, which should afford material for the identification of a large number of our more important tree species, and a botanist has been sent with them to Buitenzorg, Java, in order that he may make use of the famous botanical gardens and the fine herbarium and library there in identification. Much difficulty in classification, and in the collection of Government charges on lumber, is at present occasioned by the fact that the exact identity of many of our commoner tree species is not known to us. It is hoped that this state of affairs may be remedied to a considerable extent in the near future.

FORESTRY REGULATIONS.

The present forestry regulations have proved satisfactory in the main, but the time has arrived for carefully revising them in the light of practical experience extending over a period of more than two years. There has been some complaint that the Government charges on timber were too high, but in view of the high prices which the local lumbermen get for all lumber which they are able to put on the Manila market this complaint seems groundless.

Provision should, however, be made for the issuing of licenses under special contract covering periods sufficiently extended to justify companies in installing plants large enough to carry on lumbering operations over considerable tracts, under the supervision of the Forestry Bureau. One of the difficulties under which we labor at present is that the large and old trees, which are capable of furnishing the finest lumber, can be felled only with great difficulty with the crude appliances now available, and when once felled can not be handled, as carabaos, even in those provinces where a considerable number of them are still available, can not haul the larger logs. The result is that these trees are allowed to stand until they die. Their removal will necessitate the construction of tramways or the use of a cable system of logging, which will take comparatively large capital. It is thought by the Chief of the Forestry Bureau that a period of at least ten years should be granted by contract license for this kind of work, and that such licenses, covering tracts of forest specifically indicated by the Forestry Bureau, should be granted to the highest bidders. The Forestry Bureau would furnish working plans of such tracts, showing the variety and amount of timber which could be cut, the length of the haul, market price of the better-known varieties, and cost of transportation, in order that intelligent bids might be made. Under the regulations proposed by the Chief of the Forestry Bureau, the local residents in districts covered by special contracts would be given every facility to secure such lumber as they might require for their personal use, and the contract would cover only timber cut for the market. The necessity of supervision over the cutting of timber is demonstrated by the fact that under the old haphazard policy some islands and many provinces have been practically denuded of merchantable timber.

During the past year no lumber company has cut as much as

100,000 cubic feet. Under the contract license system, if adopted, it is hoped that a larger amount of timber will be cut. It will take a number of well-equipped companies many years to cut a small part of the overmature timber which the Forestry Bureau is now ready to mark for immediate removal.

PHILIPPINE SAWMILLS.

There are 14 sawmills in the Philippine Islands using steam or water power, 8 of which are in Manila and 6 in the provinces. An extremely slow feed and first-class sawyers are necessary in working up the hard woods. The slowest feeds of some of the saws recently set up in Manila proved too fast and teeth were stripped from them in consequence. The Manila mills have a total daily capacity of 3,660 cubic feet. There are in addition 33 establishments in Manila where sawing is done by hand. These hand mills employ 432 men using 159 saws, and have a daily capacity of 1,897 cubic feet. The cost per cubic foot of sawing by hand is usually not less than 30 cents Mexican. The lowest price at which any steam mill at Manila is sawing into boards an inch or more in thickness is 17 cents per cubic foot, and this price applies only to mixed shipments, a higher price being charged for shipments composed exclusively of the harder woods. The other mills charge from 30 to 50 cents per cubic foot for mixed shipments.

EXTENT OF FOREST LANDS.

The forest area of the Philippines, including all public and private woodlands, was estimated by Fernando Castro in 1890 to be 48,112,920 acres. The area of private woodlands held under valid title is far below 1,000,000 acres. Under existing forestry regulations owners of private woodlands must register their titles in the Forestry Bureau before cutting thereon timber or firewood for the market. The total area of private woodlands thus far registered is approximately 250,000 acres. It will be readily seen, therefore, that under existing conditions the timber necessary for the people of these Islands comes almost exclusively from the public lands.

RUBBER AND GUTTA-PERCHA.

Dr. P. L. Sherman, who was sent to investigate the rubber and gutta-percha industries in the Straits Settlements, Java, and Sumatra in 1901, and whose report thereon has already been made

public, was upon his return dispatched to Mindanao and the Sulu Archipelago with a view to investigating as carefully as possible the question of the existence of rubber and gutta-percha in the forests of the southern Philippines, the character of such products if found, the practicability of marketing them, and the protective measures necessary to prevent the destruction of trees, which has been carried on with such disastrous results in Borneo, Java, and the Straits Settlements. The results of his work are embodied in an important communication which the Chief of the Forestry Bureau has incorporated in his annual report.

Dr. Sherman made an unsuccessful attempt to reach Sibutu, the westernmost island of the Sulu Archipelago, but was informed that neither rubber nor gutta-percha grew there. Tawi Tawi was found to produce both in large quantities. He reports gutta-percha plentiful in certain parts of Mindanao, but did not find rubber, although the Moros assured him that it grew about the head waters of the Rio Grande. Numerous samples of rubber and gutta-percha were secured. *Dichopsis gutta*, the tree from which is obtained the finest gutta-percha known, was not met with, but other trees of the same genus were found. The gutta-percha of the southern Philippines is of fair to poor quality, containing a considerable amount of dirt and resin, but a method has been worked out in the Government chemical laboratory for the extraction from it of chemically pure gutta, equal in every way to the best gutta heretofore put upon the market, which, before the supply was exhausted, brought \$700, Mexican, a picul in the Singapore market. The crude gutta-percha from which our pure gutta is extracted costs from \$30 to \$70, Mexican, per picul in the Mindanao market. The purifying process involves the loss of about 50 per cent of the original mass.

Dr. Sherman found that the felling and ringing of gutta-percha trees, which has wrought such havoc in other gutta-producing countries, was in vogue throughout the southern islands, in spite of forestry regulations to the contrary. In Tawi Tawi gutta-percha is extracted from time to time by the Moro inhabitants at the direction of the Sultan of Sulu, who purchases the product at his own price and then markets it. In Mindanao, however, although the Moros bring the gutta-percha to the market, it is extracted for the most part by the wild people inhabiting the almost unknown interior of this great island.

It is easy to adopt regulations prohibiting the destruction of gutta and rubber trees, but under existing circumstances such regulations can not be made effective in the regions where these trees grow. They are usually found singly and at considerable intervals over enormous areas, and it is simply impossible to watch and protect the individual trees; yet the prevention of their destruction is a matter of the utmost importance.

In view of the experience of other countries and the evident uselessness of the protective methods that have been there followed, I am inclined to recommend the establishment of a Government monopoly in gutta-percha. Exportation, except by the Government, could be prohibited, and such prohibition could be made fairly effective. Government buyers could be located at suitable points. The Government could well afford to pay a price considerably higher than that which has heretofore prevailed for the Philippine product, thereby avoiding ill feeling on the part of the gatherers, and by limiting the amount which it purchased could greatly retard the present rapid destruction of the trees. The Government buyers would necessarily come in close contact with the collectors, and something might eventually be done in the way of introducing proper methods of extraction in place of the present destructive processes, although the experience of other countries leads me to doubt whether much can be accomplished along these lines. At all events, the establishment of suitable extraction plants would make it possible to utilize the large amount of gutta-percha which is now left in the bark of trees that have been felled and ringed. As time went on it might become feasible to grant the privilege of extracting and marketing gutta from the trees in fixed areas, under suitable regulations, to private individuals.

Dichopsis gutta should be brought in from Borneo for planting, and adequate provision should be made to grow Government gutta-percha forests, conveniently situated and capable of thorough protection, before the native trees are destroyed.

I am fully convinced that the only method of stopping the destruction of gutta trees which can be made immediately effective is the prohibition of exportation except by the Government, and the limitation of the amount of the product acquired by the Government for this purpose. Legislation on this general subject will be recommended to the Commission in the near future, and prompt

action should be taken. At the present rate of destruction there will be no gutta-percha trees standing four years hence.

It is difficult to obtain really reliable information as to the present exports of gutta-percha from the Philippines. Singapore is the principal and almost exclusive eastern market for it. During the calendar year 1901 the "Sulu Archipelago" was credited with 1,966.5 piculs, and the "Philippines" with 105 piculs. The average import value of the gutta-percha received at Singapore *directly* from the Philippines was only \$76.68, Mexican, per picul, as compared with \$169.91, Mexican, for the product received from other sources, but it is known that large quantities of gutta-percha not credited to these Islands, but actually shipped from our southern ports, are credited to Borneo.

QUANTITIES OF FOREST PRODUCTS TAKEN FROM PUBLIC LANDS DURING
THE FISCAL YEAR ENDING JUNE 30, 1902.

There have been taken from the public lands of the Philippines during the fiscal year ending June 30, 1902 :

Timber	cubic feet....	3,637.392
Firewood	do.....	3,808.870
Charcoal	do.....	247.947
Rattan	pounds....	20.685
Dye woods.....	do.....	2,256.458
Tan bark	do.....	312.154
Gum mastic.....	do.....	1,082.235
Rubber (of superior quality).....	do.....	282.996
Gutta-percha (of low grade).....	do.....	373.331
Vegetable oils	gallons....	9.181
Pitch	pounds....	113,905
Cinnamon	do.....	20.685

The total revenue derived from these products was \$348,073.08, Mexican. Government charges on timber during this period have averaged a little more than 6 cents, Mexican, per cubic foot, which has been between 5 and 10 per cent of the market price of the timber at Manila.

Government dues on forest products are collected by provincial treasurers, or in the provinces where civil government has not been established by internal-revenue officers, and covered into the Insular Treasury. The cost of maintaining the Forestry Bureau for each quarter is deducted from the revenues so received, and the balance remaining is divided between the provincial and municipal govern-

ments in the provinces from which the products originally came, one-half of the amount remaining after the pro rata deduction for the expenses of the Forestry Bureau going to each provincial government and the remaining half being distributed among the several municipalities in proportion to the amount of the original collections on the products coming from each of them, the close relationship between the construction of roads and the practicability of the removal of lumber from the forests making it seem to the Commission desirable that a considerable part of the funds derived from taxes on forest products should be spent in the regions from which such products are derived. Prior to July 1, 1902, all revenue from forest products was returned to the provinces and municipalities, and the entire expense of maintaining the Forestry Bureau was borne by the Insular Government.

For further details relative to the work of the Forestry Bureau, reference is made to the report of the Chief of the Bureau for the year ending August 31, 1902.

MINING BUREAU.

The Mining Bureau still remains without satisfactory quarters, and there seems little probability that this difficulty can be remedied except by building. It is hoped that after the completion of the main building for the Bureau of Government Laboratories wings may be added which will accommodate the Mining Bureau, Forestry Bureau, Bureau of Public Lands, and Agricultural Bureau.

The Mining Bureau has been obliged to move during the present year from the Cuartel de Ingenieros to the old Mint Building, where it is now temporarily housed.

The work of the Bureau has progressed very satisfactorily. A number of important reports have been prepared by its chief, among which may be mentioned a report on the Sanger, Vera & Co. claims and record, a report on the Gil Brothers' coal mining claims on the Island of Batan, a report on the mining claims of Antonio Fuset, a report on the Spitz coal mines and claims in Cebu, and a report on the iron mines of Angat, in Bulacan, including the "Constancia," "Santa Lutgarda," and "Hison" mines.

The important work of completing a chronological index to the records, archives, books, and papers of the Mining Bureau has been practically finished. The index book shows in chronological order every document and entry, with a brief abstract giving the nature of the paper referred to, the province to which it relates, the class and kind of material, the name of the person or persons in interest, and a reference to the portfolio or book in which the original document can be found. The great mass of records in the Mining Bureau has thus been made readily accessible, and I take pleasure in expressing my satisfaction at the accurate and painstaking manner in which this difficult and tedious work has been performed.

MINERALOGICAL AND GEOLOGICAL SURVEYS.

The restoration of order throughout the Archipelago has made it possible to send out field parties, and the Mining Bureau has inaugurated a proposed series of mineralogical and geological surveys by making a detailed examination of the iron mining region in the

vicinity of the municipality of Angat, in the Province of Bulacan. A party of seven men remained in the field for forty-five days, at a total cost to the Insular Government of \$527.55, United States currency. A large amount of information was secured and embodied in a special report, entitled "Report on a geological reconnaissance of the iron region of Angat, Bulacan." This report will be issued as a bulletin of the Bureau, and will form one of a series of bulletins for the use of miners and prospectors and for the information of the general public. The first of this series, entitled "Platinum and associated rare metals in placer formations," has already been published and widely distributed.

An abstract of the Spanish mining code for these Islands, previously prepared by the Chief of the Mining Bureau, has been carefully revised, annotated, and published. It should be of great use in the settlement of legal questions which may arise with reference to Spanish mining grants.

Considerable additions have been made to the museum of the Bureau during the past year.

In view of the enactment by Congress of a mining law for this Archipelago which places the administrative work with reference to mining claims hereafter located in the Bureau of Public Lands, it would seem advisable also to transfer to that Bureau the administrative work arising in connection with the old Spanish mining grants, which under the Spanish law was performed by the Mining Bureau. Legislation to this end will be recommended in due time.

LEGISLATION RECOMMENDED.

While there has been some complaint among miners as a result of the provision of the recent act of congress that "the holder of a mineral claim shall be entitled to all minerals which may lie within his claim, but he shall not be entitled to mine outside the boundary lines of his claim continued vertically downward," the only provision in that act with reference to mineral lands which has provoked serious criticism is the one contained in section 33, which prohibits any person from holding "in his, its, or their own name, or in the name of any other person, corporation, or association, more than one mineral claim on the same vein or lode."

It should be remembered that there is no mining industry in the Philippines to-day. Although many of the islands undoubtedly

have rich and extensive mineral deposits, the obstacles imposed upon the prospector by the heat of the lowlands and by the dense tropical vegetation, which usually covers, and to a large extent conceals, soil and rock formations, as well as by the existing lack of transportation facilities, are very great. There have been found in Benguet and Lepanto small bodies of extremely rich ore, but the veins are narrow and crooked, owing to volcanic action, which has played such an important part in these Islands in the recent past, and to earthquakes, which are still very frequent, and "faults" are extremely common. It is not to these small bodies of rich ore, therefore, that the miner must look for his returns, but to large masses of low-grade free-milling ores. Considerable masses of such ores have been found, but they are for the most part far from the seashore, and their successful development necessitates the construction of roads and the installation of expensive machinery. The miners maintain, with apparent reason, that the necessary capital can not be secured for the development of these deposits if no person, or association of persons, is allowed to own or have an interest in more than a single claim on the same vein or lode.

It is surely unnecessary to discuss the advantages which would result from the active development of the mineral wealth of these Islands, and there would seem to be no good reason why the miners here, who must create a new industry, should not be as liberally treated as are miners in the United States. I therefore hope that the Commission will urge upon Congress the modification or repeal of section 33 of "An Act temporarily to provide for the administration of the affairs of civil government in the Philippine Islands, and for other purposes."

For further information as to the work of the Mining Bureau, reference is made to the report of the Chief of the Bureau.

BUREAU OF PATENTS, COPYRIGHTS, AND TRADE-MARKS.

The work of this Bureau has remained so small that it could be readily performed by one clerk, who has acted under the general supervision of the Chief of the Forestry Bureau. Since July 1, 1901, 224 certified copies of United States patents and 84 certificates of registration of United States trade-marks have been filed. The receipts of the Bureau from fees during this period have been \$331.15, United States currency. In addition to this the sum of \$259.50, Mexican currency, was received from sales of stamped paper for the annual payment of patents and the renewal of trade-marks granted by Spain and in force in these Islands on the date of American occupation. There are about 3,000 Spanish patents, 202 Spanish trade-marks, and 152 Spanish copyrights on file in the Bureau.

Although provisions exist at present for the protection of United States patents and trade-marks here, there is no protection for United States copyrights, nor is it possible for inventors to protect themselves by taking out patents in these Islands. Although the Filipinos are apparently not an inventive people, the few applications for patents and for copyrights which have been made since 1899 having come almost exclusively from Americans or Europeans, the lack of a law providing for the registration and protection of trade-marks has been a great hardship. The American occupation has led to the introduction of many new articles of commerce and has caused a greater demand for articles previously used, but there is no protection for new trade-marks, and advantage has been taken of this fact to flood the market with cheap imitations of many standard articles. It is important that a trade-mark law should be speedily enacted.

For further information as to the work of the Bureau of Patents, Copyrights, and Trade-Marks, and for a brief résumé of orders, circulars, and letters relative to patents, copyrights, and trade-marks in the Philippine Islands, reference is made to the report of Capt. George P. Ahern, Ninth United States Infantry, in charge of the Bureau.

BUREAU OF GOVERNMENT LABORATORIES.

The reasons which led the Commission to establish a Bureau of Government Laboratories were enumerated in the last annual report of that body. The policy outlined in that report has been strictly adhered to during the past year, and the not altogether unnatural desire on the part of heads of Bureaus to establish separate laboratories for carrying on their special lines of work has been steadily resisted. As a result, a broad foundation has been laid for future scientific work in connection with the safeguarding of the public health and the development of the material resources of this Archipelago, where such work, if properly carried on, will certainly lead to results even more important and far-reaching than those which have been obtained under somewhat similar conditions in Java. Except for some investigation in systematic botany, and the meteorological, astronomical, and magnetic work of the Manila Observatory, no scientific research worthy of the name was carried on under Spanish rule, and we found ourselves practically without equipment, and entirely without laboratory facilities, for such work.

Dr. Paul C. Freer, whose familiarity with the laboratories of Europe and America fitted him to superintend the establishment and equipment of this important Bureau, was appointed its chief and accepted the position on June 21, 1901. Under instructions from the Commission, he visited many laboratories in the United States for the purpose of seeking available candidates for future positions in the Philippine service and of obtaining information likely to be useful in planning a suitable building and equipping it with the necessary library and apparatus. He reached Manila on September 25.

There had existed prior to his arrival a "Municipal Laboratory of Manila," established under the Military Government, where biological and chemical work had been carried on for the Board of Health of Manila. The property belonging to this laboratory had passed to the possession of the Civil Government, but it had been necessary to vacate the old laboratory building and store the

apparatus in the basement of the Civil Hospital. The urgent necessity of laboratory facilities in connection with the work of the Civil Hospital and the Insular Board of Health made it imperatively necessary that this state of affairs be remedied at once. A small building immediately in the rear of the Civil Hospital was finally secured, and, although it was not suited for laboratory purposes, such apparatus as was available was installed there and chemical and biological work began. It has been necessary to make two additions to this building in order to get the laboratory force and the gradually increasing equipment under cover, but in view of the fact that the construction of an adequate and suitably equipped building for the Bureau has been contemplated from the outset, and has now actually begun, no expense has been incurred in connection with the present quarters which could be avoided.

From the day the laboratory was opened the Insular Board of Health, the Bureau of Customs and Immigration, the Civil Hospital, and the courts of the Islands availed themselves of the opportunity afforded by its inadequate facilities, and the volume of work has steadily increased until it has reached a limit which can hardly be exceeded prior to occupancy of the new building.

Richard P. Strong, Ph. B., M. D., First Lieutenant and Assistant Surgeon, U. S. A., who had carried on important investigations with reference to tropical diseases during his Army service in the Philippine Islands, and who was at the time absent on leave in the United States, was appointed Director of the Biological Laboratory, and arrived in Manila on January 1, 1902. Most of the employees of the Manila Municipal Laboratory were taken over at the outset, and other employees have been added from time to time. The working force of the Bureau at present consists of one chemist and investigator, one chemist, one physiological chemist, one analytical chemist, two assistant chemists, one assistant biologist, one assistant bacteriologist, and a photographer, with the necessary clerical assistants and laboratory servants.

A large amount of the time of the Superintendent of Government Laboratories has been devoted to completing plans for a new building, in coöperation with the Chief of the Bureau of Architecture, and to listing and securing prices on the books and apparatus necessary to properly equip it.

This building, upon which work has already begun, will provide

adequate space for the Chemical and Biological Laboratories, the Serum Institute, and for a library of 30,000 volumes. It is intended primarily as an institution for practical investigation rather than for instruction, and large rooms are therefore unnecessary. Each class of work will have separate space allotted to it, so that it will not interfere with other work which is being carried on simultaneously. The Chemical Laboratory will afford space and thoroughly adequate facilities for the analysis of minerals, mineral products, and rocks, water, soils, food products, paints, oils, beverages and other materials, and for investigations with reference to the natural resources of the Islands, the means of improving present products, and the possibility of developing new industries. Rooms will be provided for distillation, for the examination of plant products, and for work in pharmacology, with special reference to the value of our numerous medicinal plants.

A part of the ground floor of the Chemical Laboratory will be set aside for a physical laboratory, which will be equipped for gravimetric, volumetric, thermometric, and photometric work, and for electrical measurements, and will provide suitable facilities for standardizing weights and measures.

The Biological Laboratory will have suitable space and proper equipment for the making of diagnostic analyses, bacteriologically and otherwise, and for the investigation of tropical diseases of man and of the plants and animals useful to man.

In order to give the necessary floor space for carrying on these several kinds of work and for housing an adequate library, the building will be two stories high, 216 feet long, and 60 feet wide. Laboratory desks will be provided with gas and water, and, where necessary, with steam and vacuum. An adequate power plant will furnish vacuum, steam, and water, and will supply electricity for the various motors and for lighting the building. Boilers and engines will be housed in an addition 115 feet long and 68 feet wide, in the rear of the laboratory structure proper. This space will afford room for the necessary engines and boilers, and for additional boiler and engine space when the erection of other Government buildings makes it desirable to derive more power from this plant. In the addition will also be established the laboratory of the Serum Institute and a refrigerating room for the preservation of serums and prophylactics and such other chemicals and supplies

as must be kept cold. Animal houses will be built in the rear of the laboratory building. The details of the building have been planned by the Insular Architect, Mr. E. K. Bourne, and will be found in his annual report.

When this building is erected and equipped the facilities which it will afford for investigation, taken in conjunction with the rich material available, will certainly serve to attract scientists to this interesting and important field. It is an encouraging fact that a number of well-known investigators have already indicated their willingness to come to these Islands and work for a year or more, for their bare expenses, when suitable facilities have been provided.

THE SERUM INSTITUTE.

A Serum Institute, under the Insular Board of Health, was provided for by Act No. 389, and has been established on the San Lazaro Hospital grounds, where temporary sheds for vaccine calves and for horses and cattle, as well as fenced inclosures for isolating animals which are under treatment, have been provided. A limited amount of anti-plague serum was manufactured here during the last days of the plague epidemic, but the greater part of the serum used in combating this disease was imported at considerable expense from Japan, before the establishment of the Institute. The imperative necessity of manufacturing anti-rinderpestic serum in large quantities, if the prostration of agriculture which at present exists in these Islands, due to the loss of draft animals, is to be relieved; the standing necessity for the manufacture of vaccine virus in large quantities; the presence of hog cholera, and of other very destructive epidemic diseases of domestic animals, such as surra, glanders, and hoof-and-mouth disease, sufficiently indicate the importance of the future work of the Serum Institute, not only in manufacturing serums already known, but in conducting investigations, in conjunction with the Biological Laboratory, for the working out of serum treatments for combating diseases for which no remedy has yet been found. It seems evident that the Serum Institute should be incorporated with the Bureau of Government Laboratories, and legislation to this end is recommended. As a matter of fact, although nominally under the Insular Board of Health, its operations have thus far been actually superintended almost exclusively by the Directors of the Biological and Chemical Laboratories.

WORK OF THE CHEMICAL LABORATORY.

In spite of inadequate facilities, the routine work of the Chemical Laboratory during the past year has embraced 89 analyses of paints, 31 of liquors, 25 of oils, 1 of glycerine, 6 of foods, 11 of textile fabrics, 15 of coals, 5 of iron ores, 3 of other minerals, 3 of limestones, 8 of soils, 1 of wood extract, 1 of stone, 319 of urine, 11 of carabao and cow milk, 3 involving suspected poisoning, 6 of water, 1 of coffee, 2 of human milk, 1 of salt, 2 of gastric juice, 1 of contents of stomach, 1 of feces, 5 of disinfectants, and 15 miscellaneous, making a total of 566 analyses. In addition to 170 analyses for the Custom-House, the Director of the Chemical Laboratory has been called upon to make eight Custom-House decisions. The Departments of the Government interested in this work have been the Bureau of Customs and Immigration, Mining Bureau, Forestry Bureau, Bureau of Architecture, Civil Hospital, Insular Board of Health, Courts of First Instance, Police Department of the city of Manila, Insular Purchasing Agent, Bureau of Agriculture, and Bilibid Prison. I believe I am correct in saying that in but one instance has an appeal been taken from a Custom-House decision based upon results obtained in the Laboratory, and a considerable saving of revenue to the Government, by proving the exact nature of substances which it was desired to pass through the customs, has resulted. In the case of paints, for instance, of which 77 samples were examined, 55 were zinc colors, of which 53.3 per cent were found to contain materials that caused a surtax of 50 per cent of the regular rate to be collected, and 78.4 per cent of the remaining metallic colors examined were found to be liable to a surtax of 50 per cent.

The Laboratory has also manufactured upon a considerable scale benzoyl-acetyl peroxide, which has been used very successfully in combating cholera and in the treatment of amebic dysentery. For further details as to the results of the use of this new antiseptic see the report of the Superintendent of Government Laboratories.

Very important work has also been done on gutta-percha, resulting in the discovery of a simple, comparatively inexpensive, and commercially practicable process for obtaining pure gutta from the gutta-percha of different grades which is produced in large quantities in this Archipelago. As all of the gutta-percha thus far discovered in the Philippines contains a sufficiently large percentage

of resin and other substances to make it of but medium or poor grade, the importance of this discovery will be readily appreciated. Chemical and physical tests applied to the pure gutta extracted from several of the Philippine gutta-perchas show it to be quite equal to the best Singapore gutta. Good rubber has also been found, and it is yet to be shown whether with proper coagulating and drying it will not equal the best Para rubber.

WORK OF THE BIOLOGICAL LABORATORY.

During the brief existence of the Biological Laboratory it has been called upon not only to do a very large amount of routine diagnosis, but to carry on work in connection with bubonic plague, cholera, rinderpest, surra, and amebic and other dysenteries, as well as a considerable number of other tropical diseases. The Board of Health, Civil Hospital, physicians, and other persons interested have shown their confidence in the results obtained in the Laboratory by their constantly increasing calls for its services. I have elsewhere referred to the great importance of the work done in examining rats for bubonic plague, which I believe made it possible to stamp out that disease and avert a serious epidemic, thereby saving hundreds of thousands of dollars and many lives.

Upon the appearance of Asiatic cholera the Biological Laboratory gave a conclusive and final diagnosis in less than forty-eight hours after the discovery of the first case, thereby silencing to a considerable degree the popular outcry with which the radical measures adopted for the suppression of this disease in Manila were met, and encouraging the health authorities to persist in these measures in the certainty that the logic of events would justify their action.

Many animal maladies, such as surra, glanders, farcy, and hog cholera, have been diagnosed with certainty during their early stages, so that the saving of numerous animals has been possible. A new horse disease resembling glanders has been discovered. It can be readily and certainly diagnosed with the microscope, and is much less fatal than glanders: in fact, a large majority of the cases eventually recover. Undoubtedly many animals attacked by it have been killed within the past two years on the supposition that they were suffering from glanders. Needless destruction of animals which have this disease can hereafter be avoided by a simple microscopical examination.

The clinical work of the Laboratory has included all of the examinations necessary for the Civil Hospital, San Lazaro Hospital, Bilibid Prison, and the various cholera hospitals. The examinations made include 361 of sputa, 173 of urine, 253 blood specimens for malaria, 74 serum reactions for typhoid fever, 115 blood counts, 1,142 for gonococci, 1,626 of feces, 976 for spirilla of Asiatic cholera, 15 for Lymphangitis epizootica, 3 for glanders, 48 for surra, 6 for hog cholera, and 650 examinations each involving a search for the following organisms: *Ameba dysenteriae*, *Ameba coli*, monads, *Strongyloides intestinalis*, ova of *Trichocephalus dispar*, ova of *Uncinaria duodenale*, ova of *Ascaris lumbricoides*, and of *Tænia*.

Nineteen thousand seven hundred and sixteen doses of plague serum were also prepared at the Biological Laboratory prior to the establishment of the Serum Institute, and delivered to the Board of Health.

Owing to the quarantine regulations and the restrictions placed by the Board of Health upon persons who had been in contact with cholera suspects or who had been living in houses where cases of supposed cholera had occurred, it was most important, in order to avoid injustice, to have early and final diagnoses made, and the Biological Laboratory did this work in a very satisfactory manner. Autopsies were performed at first on all suspicious cases which resulted fatally. Later, when the number of dead greatly increased, autopsies were omitted on cadavers coming from hospitals where a positive diagnosis during life had been possible. More than a thousand autopsies were, however, performed, and a very large number of bacteriological examinations were made on material from living patients. One thousand one hundred and thirty-four cultures were made from food stuffs, water, clothing, etc., in an attempt to trace the process of cholera infection. The city water was kept under unremitting surveillance. Examinations were made upon flies, which demonstrated the existence of living cholera spirilla in the intestines of 13 out of 27 specimens twenty-four hours after feeding upon fresh cholera stools.

LOCUST FUNGUS.

Tubes of a fungus which produces an epidemic disease among locusts were received from Cape Colony and from Washington, D. C., in December, 1901, and cultures in large quantities were

prepared for shipment to all the provinces of the Archipelago, in many of which plagues of locusts were causing serious destruction. Great difficulty has been experienced in getting the Filipinos carefully to follow instructions in using the fungus. In many cases, either through neglect or through fear that persons eating the infected locusts might themselves become ill, it has not been used. Little by little, however, the prejudice against it is being overcome, and in a number of instances most satisfactory results have been reported. Very dry weather has proved an obstacle to infection. In one of the most strikingly successful cases of the use of the fungus, eight or ten locusts were captured, infected, and released at 4 o'clock in the afternoon on a plantation of the Philippine Sugar Estate Development Company, in the Province of Bulacan. On the following day more than 30 cavares (64 bushels) of dead locusts were found in the vicinity of the place where the infected locusts were released, and the remainder of the swarm had disappeared.

For a fuller account of the new building of the Bureau of Government Laboratories, the equipment and library facilities which it will possess, and of the work of the Chemical and Biological Laboratories and of the Serum Institute, reference is made to the report of the Superintendent of Government Laboratories for the year ending August 31, 1902.

PUBLIC LANDS.

Act No. 218 of the Commission, providing for the establishment of a Bureau of Public Lands, was passed September 2, 1901, and on September 4 Mr. Will M. Tipton was appointed Chief of this Bureau. In view of the restrictions with reference to the sale or lease of public lands imposed upon the Commission by Congressional action, it was deemed impracticable to do more than attempt to get together the incomplete records with reference to public and private lands which remained in the Government archives, and systematically examine and classify them.

Considering the state of the records, good progress has been made in this work. Eight thousand four hundred and seventy-eight documents have been examined, abstracted, and entered upon a tabulated record. Some 20,000 documents, most of which are believed to be of slight importance, remain to be examined.

Act No. 218 provided for no clerical assistants except a chief clerk, and made it incumbent upon the Chief of the Bureau to recommend a permanent form of organization and force of employees at the proper time. Señor Gregorio Basa, a lawyer who had acquired an intimate knowledge of the Spanish land laws during eighteen years of service as an employee of the Spanish Government, was appointed chief clerk. The force of the Bureau has since been increased by the addition of one clerk of class 8, one clerk of class 10, two clerks of Class I, and a messenger.

Since June 2, 1902, on which date the Chief of the Bureau of Public Lands was authorized by executive order of the Acting Civil Governor to issue certified copies of documents bearing upon land titles, 28 certified copies, aggregating 43,168 words, have been issued by him.

Numerous inquiries in regard to the taking up of public land have been made by Americans who signified their intention of remaining in the Islands and devoting themselves to agriculture. Many of these men who were possessed of but limited means have been discouraged by their inability to secure titles, and have left the Islands, a fact which is greatly to be regretted.

The chaotic condition of land titles which at present exists, due to the wanton destruction of many important Government records by Spanish officials shortly before the downfall of Spanish sovereignty in these Islands; to the loss of important documents through the vicissitudes of war; to the mutilation of existing records, caused by evil-intentioned persons or by insect pests, and to the rapid deterioration which documents undergo in this climate if left uncared for, makes it most necessary that legislative action should be taken in the near future which will allow of the establishment and registration of land titles. A bill providing for the adjudication and registration of titles has been drafted by the Honorable Secretary of Finance and Justice, and will soon be considered by the Commission.

In view of the present state of titles and of the obstacles presented by natural conditions, the satisfactory surveying of the public domain of these Islands will be a difficult task. It is hoped that an arrangement can be made with the Director of the Geological Survey of the United States by which a system of rectangular surveys similar to that in the United States can be combined with the geological survey of these Islands.

LEGISLATION RECOMMENDED.

In section 15 of the recent act of Congress the Government of the Philippine Islands is authorized and empowered, on such terms as it may prescribe by general legislation, "to provide for the granting or sale and conveyance to actual occupants and settlers and other citizens of said Islands such parts and portions of the public domain, other than timber and mineral lands, of the United States in said Islands as it may deem wise, not exceeding sixteen hectares to any one person and for the sale and conveyance of not more than one thousand and twenty-four hectares to any corporation or association of persons," under certain general conditions prescribed in this and the following section.

I strongly urge that the Commission recommend to Congress that the provisions as to the amount of land which may be sold to an individual or a corporation or association of persons be made much more liberal.

In discussing agricultural possibilities here I have invited attention to the favorable opportunities afforded by the soil and climate of this Archipelago to young men of limited means desirous

of engaging in agriculture, but the success of such ventures is obviously dependent upon ability to secure sufficient land. In cocoanut growing, for instance, the trees thrive in sandy soil along the sea, barely above high-water mark, on land which, so far as we at present know, is absolutely useless for any other purpose than cocoanut growing, but not more than 75 trees can be advantageously planted to the acre. If one were to take up the maximum of 16 hectares and were able to utilize all of it for planting cocoanut trees, he would be able to put out less than 1,900 trees, a number which would not justify him in engaging in the cocoanut business. If this is true of cocoanut growing, which does not necessitate the installation of any machinery, it is much more true of sugar growing. A 40-acre sugar plantation would be ridiculous, and the same statement would hold for a rice or abacá plantation of similar dimensions. If the present limitation upon the amount of public land which may be sold to an individual be not removed, the inevitable result will be that the sale of public lands to individuals desiring to cultivate upon a commercial scale sugar, hemp, tobacco, coffee, indigo, or cacao will be prevented, and those who wish to engage in any of these industries will be compelled to purchase land from persons who secured title under Spanish sovereignty, with the result that there will be little increase in the acreage which now is, or recently has been, under cultivation.

I see no good reason for imposing a severer restriction upon an individual as to the amount of land which he may purchase and cultivate than is imposed upon a corporation.

If the Filipino is ever to adopt modern agricultural machinery and to employ advanced methods of cultivation it will be only as the result of practical demonstration of the advantages of such a course. Everyone who knows him fully realizes that it is useless to attempt to argue him into giving up the methods which his forefathers have followed for generations, but he is not slow to recognize a good thing if he can see it. The educational value to these Islands of large estates under high cultivation would be very great.

We are now compelled to import large quantities of rice, while there are thousands of acres of the finest rice lands along the line of our one railway which have never yet been touched by the plow, and if this state of affairs is to be remedied these lands must be sold, or leased on long terms, in large tracts.

The small landowner should certainly be protected, and Congress has done well to safeguard his interests, but in order to achieve this end it is by no means necessary to impose restrictions which can only result in leaving enormous areas of rich agricultural Government lands uncultivated in the future as they are to-day.

These Islands have no manufactures of great importance, and if the balance of trade, which is to-day heavily against them, is to be turned in their favor it must be through the sale of the products of their forests, their mines, and their agricultural lands. If these products are to be materially increased in quantity and improved in quality, it must be by encouraging the investment of capital upon a basis which affords reasonable hope of good returns.

I believe that the individual should be treated as liberally as the corporation in the matter of the amount of Government land which he may purchase, and that the limit should be not less than 15,000 acres.

If it is not deemed advisable for the Government to part with title to large tracts of public lands, the Commission might be authorized to lease such tracts for periods of fifty years, and in that event the limit should be increased to 25,000 acres.

For further information concerning public lands, reference is made to the first annual report of the Chief of the Bureau of Public Lands.

PRESENT STATE OF AGRICULTURE.

The inhabitants of the Philippines are essentially an agricultural people. The Islands produce few manufactures of importance and their wealth has in the past come very directly from the products of the soil. Agriculture has, nevertheless, up to the present time been carried on in a very primitive fashion, with rude implements and antiquated machinery, and without the use of fertilizers or the employment of suitable methods of cultivation. The results which have been obtained under such conditions afford proof of the favorable character of the climate and the natural richness of the soil, which in many places seems to be practically inexhaustible; but rank tropical vegetation speedily invades lands that are left uncultivated, and the disturbed conditions incident to six years of intermittent warfare have operated disastrously in favoring or compelling the abandonment of large tracts of cultivated land.

One of the terrible epidemics of rinderpest which have from time to time invaded the Philippines has recently swept over the Archipelago, and the statement that 75 per cent of the horned cattle have been destroyed by this disease and by war would probably be conservative. The Filipino horses are too small to be of use in heavy field work, nevertheless they are of great value in packing or hauling agricultural products to market. Glanders has spread widely among them, and within the past year surra, a very fatal disease, has also made its appearance and has caused serious losses, not only among native horses, but among the American horses and mules as well. The result is that the people in many provinces are badly hampered by lack of draft animals, and are obliged to leave a considerable part of their land uncultivated. I believe that the problem of restocking these Islands with draft animals is one of the most serious which we are at present called upon to face. Many of the provincial governments have expressed a desire to use provincial funds for the bringing in of horned cattle. They also desire to import jackasses in the hope of being able to cross them successfully with the native mares and breed mules. Some

importations of horned cattle have recently been made by private individuals, but, practically without exception, the animals thus brought in have contracted rinderpest. The Serum Institute, however, is now manufacturing an anti-rinderpestic serum, inoculation with which confers a high degree of immunity for a period of several years, and importations of horned cattle can be made with every reason to expect success. Fortunately, there are still a few islands which have not been visited by rinderpest, and every effort will be made to protect the cattle that are left.

THE BUREAU OF AGRICULTURE.

On October 8, 1901, Act No. 261, providing for the establishment of a Bureau of Agriculture, was adopted, and shortly thereafter the Secretary of Agriculture of the United States was requested through the Secretary of War, to recommend a suitable person for appointment as its chief. Pending the receipt of his recommendation, a very limited amount of work was carried on under my direction. A considerable number of Government farms and experiment stations were said to have been established under the Spanish Government, but little actual information was available as to the extent of land included in each, the character of the soil, the crops which could be raised to advantage, possibilities as to water power and irrigation, the existence of buildings, machinery, or agricultural implements on the several farms and stations, and the state of such buildings as were known to exist. Therefore I appointed Mr. Michael R. Healy, who was recommended for this position by Dr. S. A. Knapp, Special Commissioner of the United States Department of Agriculture, a special agent to visit these abandoned Government farms and experiment stations and to report fully upon each of them.

In general, it was found that buildings, where any had ever existed, had been destroyed or had greatly deteriorated, and that farm machinery, tools, etc., had been stolen or scattered, or had become useless through neglect. In some instances tracts of land selected by the Spanish Government were found to be well suited for the purposes for which they were intended, while in other cases they were so badly situated as to suggest the advisability of their final abandonment.

At San Ramón, in the district of Zamboanga, Island of Mindanao, distant some 15 miles from the town of Zamboanga, the Spanish Government maintained a penal colony where convicts were employed to cultivate an extensive tract of land. This farm was occupied by the United States military authorities not long after the landing of American troops at Zamboanga, and an old sawmill situated upon it was temporarily repaired and used for getting out lumber needed by the Army. Something was also done

toward gathering and marketing cocoanuts and abacá (Manila hemp), which were growing on the farm in considerable quantity. On September 27, 1901, the Civil Governor was informed by General Davis that the Army was about to abandon this farm. General Davis stated that it could be leased for \$5,000 gold per year, and recommended that this course be pursued, but it was decided by the Secretary of War under the then existing Congressional legislation that the Commission was without authority to lease the property.

Mr. George M. Havice, a gentleman of considerable experience in the conducting of large estates, was appointed superintendent of the farm, and a suitable appropriation was made for conducting it. There is no land communication between San Ramón and Zamboanga, and the isolated position of the farm made it difficult to get labor. Plantations of cocoanuts, abacá, and cacao had been left for years without cultivation, the machinery and buildings had deteriorated for lack of care, and conditions in general were very discouraging. Mr. Havice has displayed great energy in his work, and present indications are that the San Ramón farm will soon produce a **considerable** re-

Upon the recommendation of the Secretary of Agriculture of the United States, Mr. F. Lamson-Scribner, who had held the position of Chief Agrostologist in the Department of Agriculture at Washington, was appointed Chief of the Insular Bureau of Agriculture on November 29, 1901, and was instructed to secure agricultural machinery, farming tools, and seeds of American vegetables and field crops, and to visit places in the United States where practical information likely to be of value to him in his future work could be obtained, before sailing for these Islands.

The United States Department of Agriculture furnished him with a large and valuable consignment of seeds for experimentation and distribution, together with a fine set of lantern slides, an extensive collection of botanical specimens, and many important publications, thus enabling the Bureau to enter the field well equipped for work. An act organizing the Bureau of Agriculture was passed on April 30, 1902. In addition to the Chief of the Bureau, it provided for an expert in animal industry, a botanist and assistant agrostologist, a soil expert, a tropical agriculturist, an expert in plant culture and breeding, and an expert in farm machinery and farm management, and for the necessary clerical

assistants. It also made the superintendent of the San Ramón farm an employee of the Bureau of Agriculture.

On July 14, 1902, the working force was increased by the addition of an expert in seed and plant introduction and an expert to conduct fiber investigations.

The first practical work of the Bureau was to get in touch with the more intelligent and progressive persons interested in agriculture in these Islands, through the medium of circular letters, which were addressed to the provincial governors and the presidents of the several municipalities, asking for information relative to the soil and agricultural products of the territory under their respective jurisdictions, and requesting addresses of persons likely to be interested in the work of the Bureau and in the improvement of agricultural conditions in general. A mailing list of nearly a thousand names was thus secured.

Eighteen thousand two hundred and fifty packages of field and garden seeds, including 134 varieties, have been distributed to 130 individuals, many of whom have shown a lively interest in the result of the experiments which they are thus enabled to make. While it is too soon to make a full statement as to the outcome of this effort to introduce new vegetables, fruits, and farm crops, the results thus far reported are decidedly encouraging. There seems little doubt that great good can be accomplished by this means, and that a number of new and valuable plants can be successfully introduced. The better varieties of tomatoes grow well throughout the Islands. Fairly good Irish potatoes and peas have been grown in the lowlands near Manila from American seed, and very fine potatoes, celery, and peas have been raised from American seed in Benguet. Beets do well in the lowlands, and radishes are ready for the table in three to four weeks after planting. Improved varieties of orange and lemon, brought from California, are flourishing, both in the lowlands and in the mountains of Benguet, while pear, peach, apricot, and plum trees have been successfully introduced in the latter region.

An effort is now being made to secure seeds of the economic plants of the Islands for experimental cultivation with a view to improvement. These Islands have heretofore produced no grapes, with the exception of a very limited quantity grown in the city of Cebu. The Agricultural Bureau has recently discovered a new

species of wild grape in the Island of Negros, the improvement of which by proper cultivation may lead to results of considerable economic importance. Vanilla is said to grow wild on Mount Banajao, in Laguna Province.

The botanist of the Bureau, who also acts as botanist for the Forestry Bureau, has already collected a considerable amount of valuable botanical material, and has gone to the famous botanical gardens at Buitenzorg, Java, for the purpose of identifying it, the destruction by fire in 1897 of the large Spanish collections identified by Vidal and of the fine reference library which formerly belonged to the Spanish Government having rendered it impossible successfully to carry on such work at Manila at the present time.

I desire to express my appreciation of the treatment that has been accorded representatives of this Government by the Dutch authorities at Buitenzorg, who not only extended every courtesy to Dr. Sherman when he visited Java to investigate rubber and gutta-percha, but offered to place the facilities afforded by their wonderful botanical gardens, their extensive laboratories, fine reference library, and large and complete herbarium at the disposal of any person whom we might desire to send to carry on further work there.

SOIL INVESTIGATIONS.

Mr. Clarence W. Dorsey, soil physicist of the Bureau, has been making a preliminary survey of the soils of the regions which at present produce the best abacá, and at the request of the governor of the Province of Union, in this island, is now investigating the soils of that province in order to determine whether abacá can be successfully grown there. Union has a long, narrow strip of level, fertile land extending from 1 to 5 or 6 miles back from the seashore and reaching from one end of the province to the other. The remainder of the province is occupied by steep hills and mountains, which at present produce only a little mountain rice and a few sweet potatoes. Should it prove, as seems probable, that abacá can be successfully raised on the slopes, the wealth of the province will be greatly increased. Similar work will be carried on in other provinces, and it is believed that the important results which have followed soil investigations in the United States can be equalled or exceeded here.

FIBER INVESTIGATIONS.

But two vegetable fibers are at present exported from the Philippines, namely, abacá and maguey, the latter in insignificant quantities. The value of abacá exports is 62.5 per cent of the total value of the exports of the Archipelago. Fifty-two fiber-producing plants are at present known to exist here, and others doubtless remain to be discovered. The investigation of the fiber-producing plants, with a view to ascertaining the economic value of the several fibers and the best means of cultivating those plants which produce fibers of commercial importance, has begun, and a preliminary report on the commercial fibers of the Philippines will soon be issued in pamphlet form.

WORK IN BATANGAS PROVINCE.

Practical work on a large scale has been made feasible in the Province of Batangas by the hearty coöperation of Gen. J. Franklin Bell, who has shown the keenest interest in promoting the agricultural development of this province by furnishing transportation and directing the coöperation of the Army officers of the several posts in the inauguration of practical experiments in the use of American agricultural machinery and the growing of alfalfa, teosinte, cotton, tobacco, and sugar cane, under modern methods of cultivation.

Batangas was formerly a rich agricultural province, sugar and coffee being its principal products. Some ten years ago its valuable and extensive coffee plantations were practically annihilated by a borer. Most of the carabaos have died of rinderpest, and from 1896 until April of the present year the province has been the theater of active military operations, which have kept the people from properly cultivating the soil, with the result that little is grown there at the present time except mountain rice, and the once important agricultural interests are practically prostrated. The people are relatively intelligent and progressive, and it is believed will profit by the practical experiments now in progress, which are conducted in such a way as to attract the attention of those who are most vitally interested in their results. There are a considerable number of persons in this province who have the necessary means for the purchase of modern agricultural machinery and good draft animals, and it is hoped that by the introduction of new crops and the demonstration of the value of improved methods of cultivation Batangas may in the not distant future be made more prosperous than it ever has been.

FARMERS' BULLETINS.

With a view to improving the methods of cultivation now in vogue, the publication of a series of farmers' bulletins is projected. A bulletin on the cultivation of sugar cane has already been issued and has been appreciatively received and widely read. A second bulletin on the cultivation of cacao, which has been raised thus far in insignificant quantities, but which might form an important export, is in preparation and will be issued in the near future.

EXPERIMENTAL WORK AT BAGUIO, BENGUET.

It may well be doubted if any region in the world offers such unexcelled advantages for experimental work with plants as are presented by the climate and soil in the vicinity of Baguio. The climate admits of the growing of a great variety of tropical, subtropical, and temperate zone plants. In the gardens of the governor one may now see coffee bushes bearing heavily, fine tea plants, hothouse gardenias, caladiums, dracaenas, frangipani, and mango trees, all characteristic of the Tropics; alsophila tree ferns, scarlet hibiscus, passion fruit, begonias, hydrangeas, and many other plants of the subtropical regions; and side by side with these, potatoes, tomatoes, peas, beans, celery, and other garden vegetables, and monthly roses, all strictly temperate zone products, while the neighboring hillsides are covered with pine trees and produce raspberries and huckleberries in considerable abundance.

With reference to the red volcanic soil which covers large areas in Benguet, and which has been considered practically worthless, Mr. Thomas Hanley, the expert of the Agricultural Bureau in plant culture, says:

"The soil of the slopes and hills is composed of a red volcanic clay loam of great depth. * * * There was something familiar to me about this red soil, as well as the surrounding hills and valleys. They suggested the soil and the scenery of a place called Mount Gambier, in South Australia, seen by the writer many years ago. The soil there, as here, is of volcanic origin, and, in the early days of occupation in that colony, the fertility of the red clay soil escaped notice. Some one, however, started cultivation, and the result was surprising. Like Benguet, the climate there is quite different from that of the lowland country. Potatoes can not be grown in the hot plains of Australia. They were tried here (Mount Gambier) and the yield was enormous. It was the same with onions. In a short time there was a rush for land, and what could be obtained for \$10 an acre previously quickly brought \$150. Mount Gambier,

in a couple of years, became famous for its wonderful crops, and since then has shipped its products to all parts of the country. The only difference I can see in the soil here (at Benguet) is that it is more tenacious in character, but not sufficiently so to prevent ready drainage."

Experimental work was begun at Baguio by Mr. Hanley at the most unfavorable time, namely, just at the beginning of the rainy season. Cabbages, tomatoes, onions, leeks, carrots, turnips, parsnips, beans, peas, cucumbers, marrow, squashes, pumpkins, salsify, Irish potatoes, white oats, wheat, millet, and alfalfa were sown. All of them germinated quickly, and there was nothing to show that the soil was deficient in plant food. The experiments at Baguio will be continued through the coming year.

AGRICULTURAL OPPORTUNITIES IN THE PHILIPPINES.

It is hardly necessary here to discuss the agricultural opportunities offered in these Islands to corporations or individuals possessing large capital and able to cultivate upon an extensive scale such crops as sugar, hemp, and tobacco. But a small part of the soil capable of producing these crops to advantage is at present under cultivation. The methods of extracting sugar now used leave approximately 50 per cent of the sugar in the pressed cane when it is thrown on the dump pile. Hemp is cultivated in a haphazard way, where it is not allowed to grow practically wild, and the fiber is extracted by hand. No systematic and sustained effort has ever been made to improve the quality of Philippine tobacco, and the methods ordinarily used in curing it are very primitive. If rich returns have been realized from the growing of these commodities in the past upon a comparatively limited scale, the results of extensive cultivation, with modern methods and machinery, are too evident to require discussion.

I desire to call especial attention to the opportunities here afforded young men of comparatively limited means to engage profitably in agriculture.

There are very large areas of Government lands admirably adapted to the cultivation of cocoanuts. Coconut trees come to bearing in from 5 to 7 years, reaching the bearing stage more slowly as the altitude increases. The trees can be grown readily and with comparatively little danger of loss. Under existing conditions, the minimum annual profit from a fairly good bearing

tree is \$1, Mexican, and frequently two or three times this amount is realized. The ground under the trees is now either allowed to grow up with brush or is kept clear by hand. The growth of underbrush injures the soil and leads to the loss of falling nuts, while clearing by hand is quite expensive. The use of mowing machines would result in a great saving in the cost of labor necessary to keep the ground clear and gather the nuts. Other crops, such as Indian corn and alfalfa, can be grown between the rows of cocoanut trees while the latter are maturing, and used to fatten hogs, which always bring a good price in the Philippine market. The demand for copra in these Islands is greatly in excess of the supply, and is steadily increasing, while cocoanut oil now sells readily in Manila at \$1.25, Mexican, per gallon.

The lands along the coast of Mindanao and Paragua are particularly favorable to cocoanut growing, and in the latter island trees are said to come to bearing in four years.

Mr. Lyon, the expert tropical agriculturist of the Agricultural Bureau, informs me that in no other country has he seen climate and soil so favorable to cacao growing as in Mindanao. The cacao now produced in that island is of superior quality, and is nearly all bought up for shipment to Spain, where it brings an especially high price. There are numerous other regions in the Islands where cacao can be raised to great advantage, but it is hardly too much to say that there is not to-day a cacao plantation in the Archipelago, the Filipinos having almost invariably contented themselves with planting a few scattering bushes, which are left practically without care to be swamped by brush and preyed upon by insects. Proper harvesting and curing methods are not employed. The fruits are torn from the bushes, injuring the bark and leaving the way open for the attacks of injurious insect pests.

An especially fine coffee is grown in the mountain regions of Benguet and Bontoc and in the Province of Lepanto. The bushes yield heavy crops and the unhulled coffee at present sells readily in Manila at \$35, Mexican, per cavan, for consumption in these Islands or for shipment to Spain. Coffee bushes come to bearing in Benguet in three years. There is no region in the United States which has a more healthful or delightful climate than is afforded by the Benguet highlands, where a white man can perform heavy field labor without excessive fatigue or injury to his health.

It is almost impossible to secure in Manila the milk needed by the sick. Fresh milk sells for 75 cents, Mexican, per wine quart. A dairy on the outskirts of the city with 95 animals, including several bulls, was netting \$5,000, Mexican, per month when the animals were attacked by rinderpest.

During the first eight months of 1902 there were cleared through the Custom-House 14,071 head of beef cattle, valued at \$406,113, United States currency, and for the same period there were imported fresh meats, such as beef, mutton, and pork, to the amount of 846,901 pounds, valued at \$47,906, United States currency. At this rate we are importing into Manila fresh meat to the value of \$609,664 per annum, exclusive of that used by the Army and Navy.

Native cattle are at present worth \$30 to \$50, Mexican, per head in Manila, and native grass-fed beef sells for 40 to 60 cents, Mexican, per pound. The pastures of Benguet, Lepanto, and Bontoc afford one vast well-watered cattle range where there is little doubt that improved breeds of horned cattle could be successfully introduced, while in the lowlands there are vast stretches of grazing lands suitable for raising cattle and carabaos. The latter are at present worth \$150 to \$300, Mexican, per head in the Manila market. Properly conducted cattle ranches will certainly yield very handsome returns.

The present cholera epidemic is believed to have been due to infected vegetables imported from China. The Chinese system of manuring growing vegetables is such as to make vegetables from that country always a source of danger to the public health, and it is important that we should have our own truck farms as soon as possible. As already stated, experience has shown that a considerable variety of vegetables can be successfully grown in the lowlands from improved American seed, and such vegetables command a ready sale at a high price in the larger cities.

Excellent native oranges are produced in the Province of Batangas, in the Calamianes Islands, and elsewhere. The trees, which are often large and vigorous, seldom receive any care, nor has any systematic effort been made to improve the quality of the fruit, which sells readily at a good price. There is every reason to believe that improved citrous fruits can be successfully introduced.

Numerous new industries, such as the raising of vanilla in the lowlands and the cultivation of fruits and vegetables peculiar to the

temperate zone in Benguet, ought, if properly conducted, to result profitably. Communication between Benguet and Manila is at present slow and unsatisfactory. Great difficulty has been experienced in constructing a carriage road from Baguio, the capital of the province, to Pozorubio, in the Province of Pangasinan, from which point there is a highway to Dagupan, but a good horse trail will probably be completed over the 12 miles of unfinished road within four or five months, and fairly quick communication can then be had with Manila by way of Dagupan and the railway.

FUTURE WORK OF THE BUREAU OF AGRICULTURE.

The practical work of the Bureau of Agriculture will be pushed as rapidly as possible. An experiment station for the testing of seeds and the growing of introduced plants and trees has been established within the limits of the city of Manila where it can be conducted under the immediate direction of the Chief of the Bureau, and where the results obtained can be seen by a large number of people. An experiment station for the growing of rice upon a large scale will be established near the center of the great rice-producing area extending from Manila to Dagupan. Other experiment stations will be established as those already provided for are put upon a paying basis. Appropriation has just been made for an extensive stock farm for the introduction and breeding of draft and dairy animals. Provincial boards have been authorized to expend provincial funds for the purchase of draft animals for breeding purposes, with a view to restocking the several provinces with animals which have in the past proved useful and with others which can be profitably introduced. The Insular Purchasing Agent and the Chief of the Bureau of Agriculture have been directed to aid provincial boards in securing suitable animals. The Commission is about to authorize the use of Government funds for the importation of draft animals to be sold on easy terms in the provinces where they are most urgently needed. The success of this effort to restock the Islands with draft animals at the present time is absolutely dependent upon the ability of the Serum Institute to turn out a satisfactory anti-rinderpestic serum in sufficient quantities, and no effort will be spared to bring the work of the Institute to a high degree of efficiency. The examination of the soils of the more important agricultural provinces will be pushed as rapidly

as possible, and the results of the work of the Bureau of Agriculture will be made known by means of bulletins for the benefit of persons resident in these Islands and of those who may desire to come here and engage in agriculture.

For a fuller account of the work already accomplished, reference is made to the first annual report of the Chief of the Bureau.

WEATHER BUREAU.

The work of the Weather Bureau has progressed very satisfactorily during the past year. Thirty-five new stations have been established. Of the 72 stations provided for in the Act creating the Weather Bureau, all but 21 are now in working order.

Difficulty was experienced in many instances in finding suitable buildings for the installation of meteorological instruments, and Act No. 368 was accordingly passed, making it obligatory upon provincial and municipal governments to provide suitable quarters for stations of the Weather Bureau, such quarters to be in the provincial or municipal buildings if practicable, and otherwise in buildings rented or constructed for the purpose at the cost of the province or of the municipality. The stations now established cover a very large area, especially in latitude, the southernmost lying in latitude $6^{\circ} 3'$ north and the northernmost in latitude $20^{\circ} 25'$ north.

The weather predictions and storm warnings at Manila, which, under the able management of Father Algué and his predecessors, have been good for many years, have become more accurate as the establishment of new weather stations has made available additional observations from important points. Predictions and warnings are now published at all stations of the Weather Bureau which are in telegraphic communication with Manila.

One great obstacle to successful work is the frequent failure of the telegraph lines during typhoon weather, when they are most needed. Many of the lines were built hastily for military purposes. Poles were often selected with a view to quick construction rather than durability, and were set while green. When of soft wood they are attacked by white ants, and if set green they soon decay, so that heavy winds cause frequent breaks in the lines. As the present poles are replaced with better ones of hard wood or of metal this difficulty will doubtless disappear to a considerable extent, but lines running for long distances through forest will always be broken during typhoons by falling trees and branches. The rapid extension of cable lines, which are much less subject to breakage, has been of the greatest service to the Weather Bureau.

NEW APPARATUS.

The apparatus at the central station at Manila has been increased by the addition of a Vicentini's universal microseismograph and a ceraunograph for the recording of flashes of lightning.

CROP SERVICE.

The inauguration of a crop service in connection with the weather service has begun, and is progressing satisfactorily.

REPORTS.

The annual report of observations for the calendar year 1900 was published at the close of 1901, and a similar report for the year 1901 was issued in August, 1902. Apart from the monthly weather bulletins, which have appeared regularly, there was also issued in June, 1902, an exhaustive and most interesting report on the climate of Baguio in the Province of Benguet, embodying observations extending over the period from September 1, 1900, to September 1, 1901.

A pamphlet entitled "Ground Temperature Observations at Manila, 1896-1902," has recently been published, and copy for another pamphlet, entitled "Report on the Seismic and Volcanic Centers of the Philippine Archipelago," has been sent to the Public Printer.

ASTRONOMICAL AND MAGNETIC WORK.

The Weather Bureau furnishes standard time daily by telegraph to all telegraph offices throughout the Archipelago. Standard time is also furnished at noon to the shipping in the harbor at Manila by means of a time ball displayed at the Observatory building, and to the business center of the city by a gun on Fort Santiago, which is fired from the Observatory by electricity.

For further information in regard to the work of the Weather Bureau, reference is made to the report of the Director for the year ending August 31, 1902.

BUREAU OF NON-CHRISTIAN TRIBES.

Pagan or Mohammedan tribes are found in Luzon, Mindanao, Panay, Negros, Samar, Mindoro, Basilan, the Sulu Archipelago, Balabac, Palawan, and the Calamianes Islands. The number of these peoples has been only roughly guessed at, and there is a lamentable lack of accurate information in regard to them upon which to base intelligent legislation. Their presence, and the existence among them of head hunting, slave hunting, polygamy, and other objectionable practices, create serious problems for the Insular Government. With a view to investigating their actual condition and to conducting scientific investigations with reference to the ethnology of the Filipinos, a Bureau of Non-Christian Tribes was created by Act No. 253 on October 2, 1901. A skeleton organization, consisting of a Chief of the Bureau, one clerk, and an agent for Moro affairs in the Joló Archipelago, was provided, and it was made incumbent upon the Chief of the Bureau at a later date to recommend a permanent organization. Dr. David P. Barrows, who was at that time employed in the Bureau of Public Instruction as superintendent of Manila schools, and who was particularly fitted, by his special studies in ethnology at the University of Chicago and by his practical field work among the Indians of the western United States, for this position, was appointed Chief of the Bureau, and in December was directed to go to the United States, confer with Government officials at Washington, and visit Indian reservations and schools, with a view to the gathering of practical information which would be of aid to him in his work here. Meanwhile the work of the Bureau was left in charge of the chief clerk. Dr. Barrows returned from the United States in May.

In order to secure further information as to the number, names, and habitats of the wild tribes, and to learn the names of persons who could give more or less accurate accounts of them, I prepared a circular letter of inquiry prior to the organization of the Bureau. This letter was sent by the Bureau to every provincial governor and to the president of every organized municipality in the Archipelago. Some 900 replies have been received, and the work of tabulating the information therein contained has been very considerable.

A syllabus for the study of the non-Christian tribes is nearly ready for publication. The working force of the Bureau has been increased by the addition of an Assistant Chief, two clerks of Class H, one employee at \$180 per annum, and one employee at \$90 per annum. Dr. Albert E. Jenks was appointed Assistant Chief. Dr. Barrows and Dr. Jenks are at present engaged in field work among the little known wild tribes of Northern Luzon.

A considerable amount of valuable ethnological material has been gathered and is being cared for by employees of the Bureau, pending the securing of suitable facilities for exhibiting it. The collector and assistant collector of natural history specimens are also temporarily included among the employees of the Bureau of Non-Christian Tribes for purposes of administration.

When the work at present in progress in Northern Luzon has been concluded, it is purposed to transfer the entire field force of the Bureau to the Island of Mindanao, with a view to the gathering of data which may be useful in the solution of the serious problems presented by the numerous Mohammedan and pagan tribes of that island.

For further information with reference to the work already accomplished by the Bureau of Non-Christian Tribes, and that contemplated in the future, as well as for a brief review of Philippine ethnology, reference is made to the first annual report of the Chief.

Very respectfully,

DEAN C. WORCESTER,

Secretary.

The PHILIPPINE COMMISSION,

Manila, P. I.